

POPULAR Computing WEEKLY

40 Rock. ©

35p 15-21 December 1983 Vol 2 No 50

This Week

Games designers

Graham Taylor looks at three different games designers — programs which enable you to write your own arcade and adventure games. See page 18.

Commodore 64

Czes Kosniowski explains how trigonometry functions can be used for different programming techniques on page 30.

Valhalla

Graham Taylor talks to John Peel of Legend about the making of *Valhalla*. See page 16.

New releases

All the latest software games including *Jumbly* from DK'Tronics. See page 80.

★ STAR
Abandon Earth
on Vic20. See
page 10.
GAME ★

News Desk

Oric 2 gets go-ahead

FOLLOWING its take-over by Edenspring Investments, Oric has put back plans for an IBM PC compatible micro.

Instead, the company will go ahead with development of a new home computer — the Oric 2 — that will compete with the Electron and Commodore 64 machines.

The Oric 2 will be broadly similar to the first Oric machine. It will run the same form of Basic in an improved Oric Rom containing some extra commands including *Verify* and *Merge*. According to Tansoft's Paul Kaufman, though, "All the existing Tansoft software will work with the new machine."

With 64K Ram, the Oric 2 will have more memory than the Oric 1. Most of the additional memory will be used as video Ram. The computer will also feature a full-size full-travel keyboard and a completely new manual.

The Oric 2 is scheduled for launch in early March and will appear after the new Sinclair 'professional computer', now expected in late February.

What future now for Atari?

THERE is increasing speculation that Warner Communications may sell its ailing Atari computer division.

This follows the recent purchase by Australian publisher Rupert Murdoch of 6.7 percent of Warner Communications. Murdoch paid \$98m for 4.4m shares, making it Warner's largest single shareholder.

The most likely attraction of Warner Communications is its extensive film library and 50 percent share in Warner Amex Cable Communications. Murdoch is already heavily involved in cable and satellite communications with News America, Skyband and Satellite Television UK, and the Warner's film library would make a rich killing.

Warner Com- **Publisher Rupert Murdoch**

munications is in deep financial trouble, mainly brought about by its Atari computer division which has lost in excess of \$500m in the last nine months.

It is now considered possible that Murdoch may try to swap his shares for Warner Bros Pictures.

In the event of a Murdoch
Continued on page 5



Classified

Computer Swap
01-437 4343

Free readers entries to buy or sell a computer.
Ring 01-437 4343 and give us the details.

AQUARIUS
SEE PAGE 55

VALHALLA

Classified

GIVE YOUR BBC MICRO SOME STICK!

Joystick utility is a very clever program that will allow you to use joysticks with most programs on your BBC Micro Computer.

★ Simple to use — just press the keys ★ Requires just one block of memory space ★ Relocatable in memory ★ Sensitivity of joysticks can be varied.

This is an invaluable program that will heighten your enjoyment of your Micro. It is very easy for the beginner to use, but also provides plenty of scope for the more experienced user.

JOYSTICK UTILITY — £5 INC. (DISC — COMPATIBLE)
CHEQUES TO:

Clares Micro Supplies
Dept. PCW, 222 Townfields Road, Winsford, Cheshire
Tel: (06065) 51374

ZX SPECTRUM 48K, programmable joystick, Ferguson cassette recorder, loads of software tapes plus magazines, including VU 3D, Blind Alley, Swordlight and more worth over £400, sell £220. 75 Hindburn Close, Bessacarr, Doncaster.

SPECTRUM 48K (issues) all complete + Manic Minor, £100. Tel: Brighton 776833.

32K RAM PACK for AM issue one Sinclair Spectrum, £18. Tel: 051 625 8604.

Classified

SPECTRUM 48K, plus ZX printer, five rolls of paper, compiler, magazines, Chess and three books, £150, will sell computer and printer for £125. Tel: Russell, 061-740 4756 (evenings).

FOR SALE! Spectrum software, 3D Tans, Orbiter, £3.50 each, Gulpman £3, Mined Out, Frenzy, Roman Empire, Escape, £2.50, Winged Avenger £2, all good condition. R. A. Kidd, 20 Buckfast Close, Ipswich, Suffolk.

WANT A GREAT BYTE THIS XMAS. Spectrum software half list price, Mad Martha's 1+2, Scrabble, Zoom, Zip-Zap and probably all others in this column. N.B. all originals. Phone Reading 697095.

Continued on page 73

BRITAIN'S BEST-SELLING MICRO WEEKLY



The first program in Software Farm's
HIGH-RES RANGE!

CAN BE SEEN AT
"YOUR COMPUTER" XMAS FAIR
STAND V25 (SINCLAIR VILLAGE)
WEMBLEY CONFERENCE CENTRE
DECEMBER 15-18

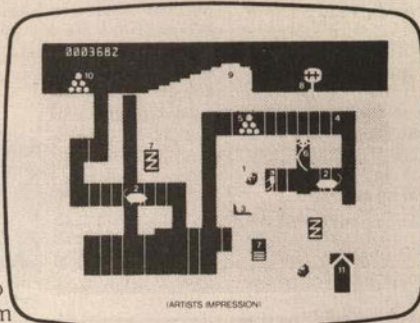
FORTY NINER the **ZX-81** **BREAKTHROUGH!** ONLY PROGRAM OF IT'S KIND IN THE WORLD!

**ZX-81 Resolution identical to the SPECTRUM
without any additional hardware!!**

In 1849 the Great American Gold rush started. Almost everyone who could, sold up everything and dashed to the west coast to look for this precious metal – including YOU!

You must dig for those nuggets (1) – But watch out for the giant rats (2) They burrow through the earth (3) to get into your tunnel. You can delay them for a while by knocking down a support (4) which causes a small cave-in (5) to block their way, but you can only destroy them by releasing a snake (6) from it's nest (7), when it heads straight for the surface, destroying everything in it's way.

All the time the Gremlin (8) is busy digging it's way through your waste earth pile (9) to reach the entrance to your mine. Once it does you have no



ACTUAL ZX-81 SCREEN DISPLAY

escape!! – so you must stop it getting there by returning to the surface to replenish the main mound (9) with the smaller pile of earth which appears on the surface as you dig (10). The deeper you dig the more points you score –

but the further you have to go to replenish that mound! Once all nuggets have been collected, a cave opens (11) allowing you to pass through to the next stage – if you can reach it! This gives you more rats – but less snakes to destroy them with!!

Skill levels

Extra man every 10,000 points

Hall of Fame

Define your own keys for ease of

play or use with any joystick

Fantastic and

unique graphics on a ZX-81 (with 16K)

Only £5.95 – No more than many ordinary programs

A truly interesting and exciting game that no ZX81 owner can afford to be without

**Available from all good computer shops
or send cheque/P.O. for £5.95 (inc P&P) to:**

Software Farm, FREEPOST (No stamp required) (BS3658)C, Bristol BS8 2YY

Software Farm, 155 Whiteladies Road, Clifton, Bristol BS8 2RF. Tel: (0272) 731411 Telex 444742 AFMADV G

The Team

Editor
Brendon Gore

News Editor
David Kelly

Software Editor
Graham Taylor

Production Editor
Lynne Constable

Editorial Secretary
Cleo Cherry

Advertisement Manager
David Lake

Advertisement Executive
Alastair Macintosh

Classified Executive
Diane Davis

Advertising Production
Lucinda Lee

Administration
Theresa Lacy

Managing Editor
Duncan Scot

Publishing Director
Jenny Ireland

Popular Computing Weekly,
12-13 Little Newport Street,
London WC2R 3LD
Telephone: 01-437 4343

Published by Sunshine Publications Ltd.

Typesetting, origination and printing by
Chesham Press, Chesham, Bucks

Distributed by S M Distribution
London SW9, 01-274 8611, Telex: 261643

© Sunshine Publications Ltd 1983



MEMBER OF THE AUDIT
BUREAU OF CIRCULATIONS
ISSN 0265-0509

Registered at
the Post Office
as a newspaper

How to submit articles

Articles which are submitted for publication should not be more than 3,000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should, whenever possible, be computer printed.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your own program returned you must include a stamped, addressed envelope.

Accuracy

Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

This Week

News	5, 7
Atari future	
Letters	9
Microdrive difficulties	
Star Game	10
Abandon Earth on Vic20	
Street Life	16
Graham Taylor talks to John Peel of Legend	
Reviews	18
Graham Taylor looks at games designers	
Programming	22
Structured programming on ZX81	
Dragon	24
Print routine by Richard Walton	
Spectrum	27
Machine code series by Trevor Toms	
Commodore 64	30
Uses of trigonometry by Czes Kosniowski	
Reviews extra	32
Dragon enhancements II by Keith and Steven Brain	
BBC & Education	36
Word search by Ian and Damian Inger	
Open Forum	53
Eight pages of your programs	
Adventure	69
Tony Bridge's corner	
Peek & poke	71
Your questions answered	
New releases	80
Latest software programs	
This week	82
Top 10 plus all this week's software	
Competitions	83
Puzzle, Ziggurat, Losers	

Editorial

Newspaper magnate Rupert Murdoch has spent nearly \$100m in acquiring a 6.7 percent share of Warner Communications. This makes Mr Murdoch, in the form of his News Corporation, the largest single shareholder in Warner.

This information is of more than esoteric interest because Warner numbers Atari among its subsidiaries. Atari, once the jewel in Warner's crown, has lost more than \$536m so far this year.

Both Warner and Rupert Murdoch would appear to be anxious to rid themselves of Atari as soon as possible. Warner can hardly continue to absorb losses on such a massive scale, while Murdoch's interest lies in Warner's film and tv operations. Atari has suddenly become persona non grata in a very big way.

However, while Warner and Murdoch might wish to offload Atari, who would want to buy it? Given the current state of the micro market, it is extremely unlikely that anyone will be able to turn Atari round and start making a profit — at least not in the short-term.

US companies, aware of the problems that have beset Texas, Mattel, Osborne and other micro firms, are unlikely to see any advantage in buying Atari. But European companies might see Atari as a useful entry to the American market, which is potentially the most profitable in the world.

Next Thursday

Can you guide Santa up and down chimneys and ladders in time to deposit all his presents? Find out in next week's star game for the Spectrum.

Subscribe to Popular Computing Weekly

I would like to subscribe to *Popular Computing Weekly*.

Please start my subscription from the issue.

UK Addresses: ☐ 26 issues at £9.98 ☐ 52 issues at £19.95

Overseas Addresses: ☐ 26 issues at £18.70 ☐ 52 issues at £37.40

Please tick relevant box

I enclose my cheque to *Popular Computing Weekly* for

Name

Address

.....

Please send this form, and cheque, to *Popular Computing Weekly*, Subscription Dept., 12-13 Little Newport Street, London WC2R 3LD.

BLASTERMIND! ★

At first glance this might seem to be just another version of a very popular game. How wrong can you be!!! True, the start is simple enough. The Spectrum picks a code of numbers or colours with a selection of levels of difficulty — and invites you to do the same. You then take it in turns to guess each others code from the clue supplied after each guess. An extremely well written, fast and very clearly displayed game, with almost inevitable defeat.

This was exactly as intended but unfortunately *something went wrong*. During the programming strange complimentary messages began to appear on the screen. At first they were so few they were not taken too seriously, but soon they could no longer be ignored. Somehow the Spectrum had been given a personality — a rather devious, supercilious, dislikeable, hateful, horrible mind.

SPECTRUM 48k £5.50



Side B contains a version of the game compatible with the excellent Currah µSpeech unit — even worse!!

The Quest of Merravid ★

VIC 20 (16k) £7.95 or Commodore 64 £7.95

A really challenging and enjoyable adventure, written by a confirmed adventure addict who grew tired of the ease with which he solved other adventures himself. Will accept and act on sentences containing up to nine words.

The adventurer becomes Merravid, charged with the task of finding, taking and then returning the magic Firestone of the Dwarves. However, overcoming the many novel and original hazards is no easy matter. Careful and imaginative thought is required if progress is to be made and the Firestone tracked down to the lair of the Dragon of Thargon. Even then the Dragon has to be defeated and the stone retrieved. A compulsive, extremely enjoyable and very user friendly adventure.



★ COMPUTER MODERATED BOARD GAMES

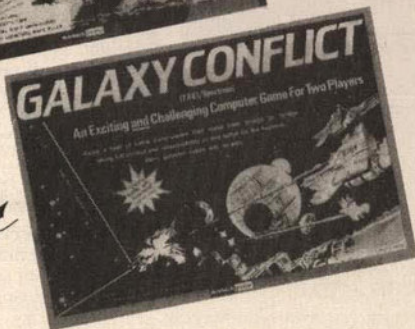


The original and completely unique two player games of cunning and strategy, strictly for more demanding games enthusiasts.

- ★ **CONFLICT** — a full scale military and economic battle demanding clear thought and decisive action.
- ★ **GALAXY CONFLICT** — a complex battle for control of the Universe.

Each game:—
ZX81 (16k) and SPECTRUM (48k) £11.95
BBC 'B', CBM-64, ATARI 800 £14.75

Attractively boxed containing cassette, full size board, pieces, maps, and full instructions.



Ideal Christmas Gifts!

Most games available from leading retail outlets.

Prices include VAT, Post and Packing

Mail order to: MARTECH HOUSE, BAY TERRACE, PEVENSEY BAY, EAST SUSSEX BN24 6EE
Telephone: (0323) 768456 Telex: 87465 EXIM Brighton

His master's voice sounds from Commodore

COMMODORE will launch its long-awaited *Magic Voice* speech synthesiser unit in January, priced around £50.

The small hardware add-on plugs into the expansion port on the Commodore 64. Software held in Rom inside the unit gives it a vocabulary of 234 words and letters which, with the exception of Z (Zee), are pronounced in an acceptable mid-Atlantic accent.

As well as the complete alphabet and the numbers 1 to 12 a selection of phonetic sounds are included to enable new words to be built up.

The unit is controlled from Basic with the simple command Say "X".

A number of 'speaking'

Rom cartridge programs are planned to accompany the Magic Voice. These plug into a cartridge port on the top of the unit. Among these are the *Magic Garden* and *Magic Toolbox* educational series of talking books from Edata, the *BJ Bear* educational programs, two arcade games *Wizard of Wor* and *Gorf* and *Magic Desk 2*.

Dragon 'poke' runs into problems

DRAGON software houses selling programs which use the so-called 'speed-up Poke' are running into problems of software incompatibility.

In earlier versions of the Dragon 32, the command *Poke 65495,0* (Hex: HFFD7,0) can be used to increase the operating speed of the Dragon's 6809E processor. A number of software houses have taken advantage of this fact to make their games run faster.

The problem is that around 20 percent of Dragons now

being produced will not accept the speed-up *Poke* command and therefore the games will not run. Among the programs affected are Beyond Software's *Up Periscope* and C-Tech's *Flight Simulation*.

The Dragon's 6809E processor is rated at a maximum operating clock speed of 1MHz and runs in normal use at 0.98MHz. The speed-up *Poke* increases the clock rate to 1.8MHz. It then depends on the tolerance of individual chips whether a particular machine will accept the *Poke* command.

One company which has found a solution to the problem is Microdeal. Its programs offer a menu choice at the start of each game where the Dragon owner can choose to play a version either with or without the speed-up *Poke*, depending on whether or not the Dragon concerned will accept it.

Dragon's Cathy Hyde says: "We do not recommend that Dragon users use the *Poke* because we cannot tell what long-term harm it will cause the machine. It is not just the Dragon's processor which has been designed to run at 1MHz, but the whole design of the computer. The peripheral interface adaptor which communicates with the keyboard and parts of the Ram have also been designed to work best at less than 1MHz."

Paintings by numbers



KOALA Painter, from Audiogenic, is a graphics tablet for the Commodore 64. Consisting of a tablet and stylus, disc-based software and manual, it enables users to draw directly on to the screen.

There are facilities for selecting colour, creating mir-

ror images, copying one part of a picture to another and erasing mistakes. The user can choose between eight brush sizes and 16 colours.

Koala Painter costs £89.95 including VAT from Audiogenic, PO Box 88, Reading, Berks RG1 2SN.

Little new at ZX fair



THE eleven and a half thousand visitors to the 9th ZX Microfair on December 3 and 4 found little new hardware or software on display.

Apart from East London Robotics' demonstration of its revolutionary new Trick-Stick Spectrum joystick, interest once again centred around new Spectrum software.

Richard Shepherd showed a new adventure by Invincible Island author Peter Cooke - *Urban Uptart*.

Silversoft, which has been rather quiet in recent months, had three new titles - *Freez'* Bees, *Robot Riot* and *Sam Spade*.

Microsphere displayed a new 48K game, *Wheelie*.

Adventure house Phipps Associates launched its first arcade titles - *House of the Living Dead*, *Killer Knight*, and *Loony Zoo*.

And Gilsoft offered a new adventure written using its games-designer program *The Quill* - *Magic Castle*.

One trend that is very noticeable with recent shows is that increasingly the Microfairs are becoming dominated by retail exhibitors. More and more software shops are attending, with fewer and fewer of the software houses choosing to show.

Rotten apples

APPLE, continuing its fight against counterfeit 'rotten' Apples, last week failed in an attempt to ban the sale of Taiwanese-made copies of its Apple II in Australia.

An Australian court ruled that the two machines - the Apple II and The Wombat - were clearly distinguishable by their names and that the Wombat distributor was not guilty of misrepresentation.

REVENGE

OF THE MUTANT CAMELS

ASTOUNDING GAME · ASTOUNDING COMPETITION

FIRST PUBLIC APPEARANCE: DEC 16 COMPUTER FAIR (WEMBLEY)

BE THERE
GET YOUR REVENGE!

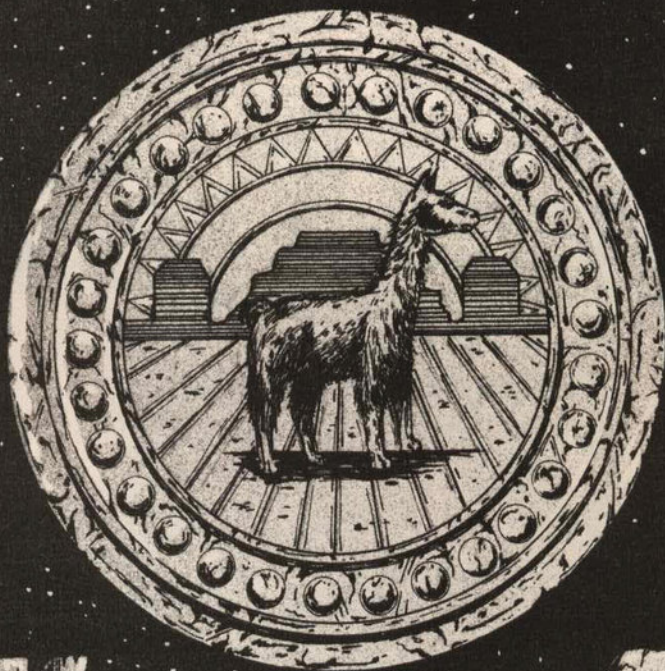
FOR COMMODORE 64 PLUS JOYSTICK

REVENGE

OF THE MUTANT CAMELS

BY JEFF MINTER FROM LLAMASOFT

£7.50



LLAMASOFT

US Viking for Dragon



DRAGON has continued to follow its American software path with the launch of seven Dragon 32 titles, all previously available in the US for the Tandy Color Computer.

The licences have been agreed by Dragon with a number of US Tandy houses —

Softlaw Corporation (Cimecon Moon), Computerware (Bloc Head and Synther 7), Prickly Pear (Viking, Shaft and Tee Off) and Spectral Associates (Whirlybird Run).

"We have had to go to the States because the 6809 chip, around which the Dragon is

based, has been rather neglected in the UK. Good software in this country is either written for the Z80 or 6502 processor," commented Dragon's Clive Johnson.

Pricing of the new titles is related to the level of royalty payment Dragon has agreed for the titles. *Whirlybird Run* from Spectral Associates costs as much as £12.95 for a single cassette title.

"It is difficult to get in contact with good individual writers and by going to established US software houses we can tap into their authors," said Clive.

At present there are no plans for any of the American companies to write material specially for the Dragon: "It wouldn't be worth their while, when they can write for both the Dragon and Tandy machines at once," he added.

Byting back



MICRO Format is offering a useful new type of add-on — the Byte Bat.

The 17 inch-long foam rubber baseball bat is ideal for those occasions when you just cannot stand it any more — and wish to take out your programming frustrations on your micro.

More details from Micro Format, 1271 West Dundee Road, Suite 16A, Buffalo Grove, Illinois 60090, USA. The Byte Bat costs \$9.95 (about £7) excluding postage and packing.

IBM contract

AB Electronics, manufacturer of Acorn's BBC and Electron micros, has won a multi-million pound contract to supply parts for the IBM Personal Computer.

IBM refused to disclose details of the contract, but AB admitted it was its biggest deal yet. Some indication of the size of the contract can be seen from AB's turnover — nearly £40m this year.

Business and accounts

GEMINI has announced a range of software titles for serious micro users.

The five packages provide home business, accounting, and mail handling programs.

Combination Home Pack 1 contains Database, Home Accounts, Mailist, Spreadsheet Analysis and Graphplot for the Electron (on cassette) and BBC (on cassette, 40- or 80-track disc) machines priced at £79.95.



Combination Home Pack 2 contains Database, Home Accounts, Graphplot and Mailist for the 48K Spectrum (on cassette) priced at £59.95.

The other three titles are Combination Business Packs 1 to 3, the first two for the BBC machine and the last for the Electron, featuring more advanced versions of the programs in the Combination Home Packs.

From February 1, the complete range of business and utility programs will be available for the Commodore 64 computer.

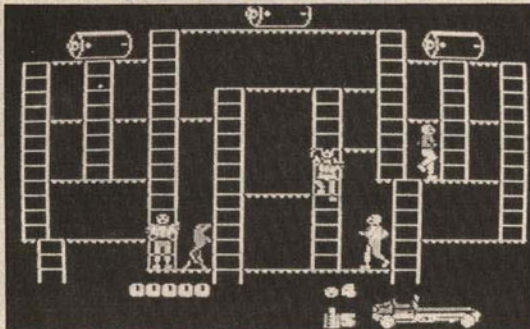
Details from Gemini Marketing, 18a Littleham Road, Exmouth, Devon.

Mattel shows no improvement

MATTEL, the US toy and video game giant, is continuing to show big losses.

Despite dropping its Aquarius microcomputer and announcing its intention to withdraw completely from the highly competitive home computer market, Mattel has recorded a substantial third quarter loss of \$46.3m. A healthy profit in its toy division was more than cancelled out by an \$82.4m. loss in its electronics and computer division.

Teddy bear's picnic



AS Imagine's *Ah Diddums* and Audiogenic's *Teddy* show, bears are in vogue.

After Christmas, Artic programmer John Ritman — author of 3D Combat Zone — will continue the trend with *Bear Bover*, his new game for the 48K Spectrum.

As Ted the bear you must leave the security of your electric car and climb a series of ladders to drop down a new set

of batteries for it. In so doing it is important to avoid the boover bears and their strange-looking pet.

John says: "It's a tactical arcade game. You can either run straight for the batteries and try to get through as many screens as you can or you can deliberately try to group the bears on a battery when you drop it — you get really high scores for that."

SCREENPLAY

134 St. Vincent Street, Glasgow G2 5JU. Telephone 041-248 2481

CHICKAROO: A word recognition game for children. Find the missing letter in the name of this game which can be used by up to four players.

PIRATES: A childrens game based on word recognition. Identify the concealed word before you reach the end of the plank or else face the perils of the deep.

A vocabulary of 100 words is supplied with both of these games, however, parents have the option of adding their own data files.

BBC EDUCATIONAL

MAD MONTY: It's mealtime for MONTY the MAD python and frogs are on the menu! Guide him round the garden gulping frogs and munching magic mushrooms — beware those toadstools and if you keep your cool mouse may be on the menu.

THE ANIMATOR: The perfect DRAGON graphics tool allows you to define your own characters and then make them spring to life on the screen. The animated routine can then be saved on tape and combined with others to create your own games.

DRAGON 32

THE ILLUSTRATOR: A graphics design package which can be used in a graphics Modes 1 or 2 to generate full colour illustrations on the screen of your micro. This package allows graphics and text to be mixed on screen and saved on tape for later use.

MAD MONTY: A fast and furious version of the snake in the garden game for the MODEL B BBC MICRO. Monty — the well known python — lives in a garden inhabited by juicy flowers. Help him munch his lunch but mind those rocks and walls!

BBC GAMES AND UTILITIES

MAD MONTY: This version of the snake game has 7 screen layouts and five speeds from sublime to ridiculous. Monty munches frogs for lunch and is partial to the odd mouse for afters.

COMING SOON: Complete machine code toolkit for the 64. Assembler, Disassembler, Monitor, Hex dump.

COMMODORE 64

SCREENPLAY SOFTWARE MORE FUN THAN GAMES

Our range of software includes games but we believe that your micro should do more than test your reflexes. For example, **CHICKAROO** and **PIRATES** are educational products designed to help you extend your childrens' vocabulary.

THE ILLUSTRATOR turns your TV screen into an electronic canvas. The only limit is your imagination. **DRAGON** users are you bored with other people's games? Let **THE ANIMATOR** help you create your own.

LIBERATE YOUR MICRO WITH SCREENPLAY SOFTWARE

BBC	TICK	PRICE
CHICKAROO	<input type="checkbox"/>	£7.95
PIRATES	<input type="checkbox"/>	£7.95
THE ILLUSTRATOR	<input type="checkbox"/>	£9.95
MAD MONTY	<input type="checkbox"/>	£7.95
DRAGON 32		
THE ANIMATOR	<input type="checkbox"/>	£9.95
MAD MONTY	<input type="checkbox"/>	£7.50
COMMODORE 64		
MAD MONTY	<input type="checkbox"/>	£6.50

Please send me the products I have marked.

Send to:

Name

Address

.....

.....

I enclose Cheque/P.O. to the value of £

made payable to Screenplay.

SCREENPLAY, 134 St. Vincent St., Glasgow G2

ALLOW 14 DAYS FOR DELIVERY.

LETTERS

Storage solution

For those of us lucky enough to own a Sinclair Microdrive, there is the slight problem of the storage of cartridges which are about 1/8 the size of the ugly old tape cassettes.

My suggestion is to use the lid (the clear plastic half) of an empty cassette box. After all, we have plenty of spare tapes now we can store so much on a tiny cartridge.

Stand the cassette box lid on its edge to form a tray with a high back and stand your Microdrive cartridges in it. The lid will stand on a working surface or the back can be glued to the edge of a shelf. Leave the insert sheet in for an index record.

Yours, one of the chosen few.

Vic Phillips
17 Elizabeth Avenue
Ibstock
Leicester

Computer loonie

I would like to know if anyone could help out a poor old computer loonie. I want a Phoenix-type game for the Commodore 64 — it must have the full five screens.

Can anyone help before I crack up? Could you also let me know the company, etc. Help!

Mark Roebuck
59 Ings Walk
South Kirkby
Pontefract
West Yorkshire

I am afraid that I don't know of any Phoenix games for the Commodore 64, but I am sure they must exist. Perhaps our readers will be able to supply some details.

Ace club

Re Phil Murray's letter of December 1. The Jupiter Ace Users Club is alive and well, has over 350 members, and is just about to issue its fourth newsletter. We welcome new members and suggest Phil writes to us. Subscription is £7 for 1984. Newsletters 1-4 cost an additional £7. Cheques payable 'Rem-

soft'. Here endeth the commercial.

Now that Jupiter have gone down the plughole, it's even more necessary for Ace users to stick together and share information.

By the way, the new Forth computer from Microkey is set for launch in January. It doesn't replace the Ace, merely complements it (128K, 3 1/2" Sony drives, good keyboard, interfaces, etc. . .).

John Noyce
Remsoft
18 George Street
Brighton BN2 1RH

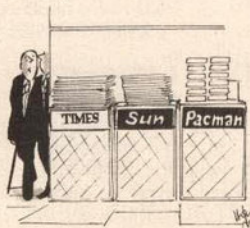
PS. Yes, I've met the theoretical ideal language types (re Jeremy Ruston's article). They're a pain. Forth is a lot more versatile than people give it credit. But even so, it's horses for courses.

Microdrive problems

Andrew Pennell and friend are not the only people to have experienced difficulties with the new Sinclair Interface 1 and Microdrive. In my own case both worked perfectly, with no sign of any problems, until a month had passed. At that point I'd either get a syntax error when attempting to initiate a Microdrive Save or Load command into the computer directly or a 'Non-sense in Basic' message when trying from within a program.

Sinclair have now replaced my Interface 1 (no 12) with another issue 2 (no 422). Unfortunately, I haven't really been able to check whether this works correctly as last week my Spectrum gave up the ghost after I plugged in Interface 2!

What concerns me about the whole situation is that we Spectrum Issue 1 owners have waited over a year for the much promised Microdrive.



"Any truth in the rumours about Rupert Murdoch and Warner Communications?..."

Are we now to discover that the useful life of a Spectrum is only just longer than that period?

Ian Maule
5 Beaconsfield Road
New Malden
Surrey KT3 3HY

Rom omission

Thank you for forwarding Gareth Rowland's letter, as it highlighted an omission in my article in the 20-26 October issue on making Rom calls. There should be eight steps, not seven! If step 3.5 "STX >SA6" is not included, the technique will not work. I apologise for the frustration this will have caused people. The eight steps should be as follows:

- 1) Create tokenised BASIC line.
- 2) LDX >SA6: PSHS X
- 3) LEAX >LINEAME,PCR
- 4) STX >SA6 -missing step
- 5) LDA X
- 6) ANDCC #FFE
- 7) JSR 12345 (or whichever)
- 8) PULS X: STX >SA6

Peter Whittaker
Cambridge

Interrupt mistake

With regard to the use of interrupts on the Spectrum by Alan Went (PCW 24-30 November).

The general article was very interesting, but he made a basic mistake in assuming that during the interrupt acknowledge cycle the data bus would contain 255 decimal. Although the data received will normally be 255, this is not always true. The actual value can be any-

where between 0 and 255, the problem being that some add on units do not decode the Ioreq and Read lines correctly.

Also, there are no true pull up resistors on the data bus which rely on the pull up effect of the memory devices, etc, to ensure 255 — this cannot be guaranteed to work.

To ensure that the interrupt will respond as required, it is necessary for it to work no matter what value is returned. To do this, we must set aside 257 bytes for an interrupt vector table. Each byte of this table contains the same value such that no matter what value is added to the I register we always jump to the correct address (257 bytes are needed, as the first byte of the vector address could be at the 256th byte ie returns 255).

In my 48K Spectrum I use Feh (254 dec) as the value stored in the table. This means that the interrupt address is at Fefeh (65278 dec). The vector table is placed at address Fdoooh to Feooh (64768 to 65024 dec).

The use of the I register at FDH does not cause any 'snow' on the screen, as this only happens between 40H and 7FH, the memory for the 16K Spectrum. But, this does cause problems for 16K owners who are unable to use this technique. The accompanying brief routine will set up the interrupt.

Anyway, thanks for an interesting magazine, keep up the good work.

D Allday
Lyans
Rusper Road
Ilfeld
Crawley
Sussex RH11 0LR

Address	Data	Code	Remarks
FE56	F3	ON DI	ensure interrupt does not occur during change
FE57	2100FD	LD HL,0FDOOH	set table
FE5A	0600	LD B,0	
FE5C	36FE	LOOP LD (HL),0FEH	
FE5E	23	INC HL	
FE5F	10FB	DJNZ LOOP	
FE61	3EFD	LD A,0FDH	set I register
FE63	ED47	LD I,A	
FE65	ED5E	IM 2	Set interrupt mode
FE67	FB	BI	
FE68	C9	RET	
FE69	ED56	OFF IM 1	turn off special
FE6B	C9	RET	reset to orig mode (no need to reset I reg.)
FEFE			Interrupt routine starts here.

Abandon Earth

A new game for the unexpanded Vic20 by Mark Manns

As the last remaining computer on the remains of the planet Earth, after the great galactic battle of 2056 AD, it is your job to get the last remaining scientists (4) to the awaiting mother ship. But it's not as easy as it seems. Not only does the mother ship move from left to right across the top of the screen, but there are also asteroids, aliens and space mines to stop your progress.

This game for the unexpanded Vic20 loads in two parts. The first part contains the instructions and the data for the graphics. The second part contains the main program. (This game uses joystick.)

Variables

TI — TIME
SC — SCORE
LI — LIVES
COL — COLOUR
BP — FIRE

BC —FIRE
M —MOVE MOTHER SHIP

Program notes

0-10	VARIABLES
10-16	MAIN ROUTINES
99-1067	SET UP SCREEN
3999-4050	LAUNCH MEN
6000-6016	JOYSTICK CONTROL
8000-8007	FIRE
10000-10006	MOVE MOTHER SHIP
20000-20011	ENDING ROUTINE
29999-30010	DETECTION + SCORING

```

10 REM*****
11 REM*MAIN GRAPHIC*
12 REM* *
13 REM* ROUTINE *
14 REM* *
15 REM* BY *
16 REM* *
17 REM* MARK MANNS *
18 REM* *
19 REM*****
20 REM* *
21 REM* DATA *
22 REM* *
23 REM*****
24 REM*LINE *
25 REM* *
26 REM* *
27 REM*103-108-SHIP *
28 REM* *
29 REM*109-LASER *
30 REM* *
31 REM*110-BEAM *
32 REM* *
33 REM*112-MAN *
34 REM* *
35 REM*113-LANDER *
36 REM* *
37 REM*114-PHASER *
38 REM* *
39 REM*115-ASTEROID *
40 REM* *
41 REM*116-ALIEN *
42 REM* *
43 REM*****
44 POKE36879,106
45 PRINT"J"
46 PRINT" ^ ^ N ^ ^ "
47 PRINT" ^ ^ ^ ^ ^ "
48 PRINT" ^ ^ ^ ^ ^ "
49 PRINT" ^ ^ ^ ^ ^ "
50 PRINT"X"
51 PRINT" ^ ^ T I I "
52 PRINT" ^ ^ I I I "
53 PRINT" ^ ^ I I I "
54 PRINT" ^ ^ I I I ....."
55 PRINT"X*****USE JOYSTICK*****"
56 FORT=1T0200:NEXTT
57 PRINT"J":POKE36869,255
58 PRINT"J POINTS "
59 GOSUB101
60 PRINT"X U J---- 100 PTS."
61 PRINT"X V J---- 500 PTS."
62 PRINT"X R J----1000 PTS."
63 PRINT"X HIT A KEY"
64 GETR$:IFR$=""THEN64
65 PRINT"J"
66 POKE36869,240
67 PRINT"YOU MUST EVACUATE THE LAST REMAINING"
68 PRINT"NUCLEAR PHYSICIST FROM EARTH,"
69 PRINT"TO AN AWAITING SPACESHIP"
70 PRINT"BUT DUE TO THE GLACTIC WAR BETWEEN ALPHA CENTURI AND THE TERRANS"
71 PRINT"LARGE ASTEROIDS AND SPACE MINES BLOCK YOUR PROGRESS"
72 PRINT"WATCH OUT, THE CENTURIANS HAVE HIRED ALIENS"
73 PRINT"TO EAT YOUR MEN AS YOU FIRE THEM OUT INTO SPACE."
74 FORT=1T09000:NEXTT
75 PRINT"J"
76 PRINT"J*****CONTROLS*****"
77 PRINT"J YOU CONTROL THE LAUNCHER AT THE BOTTOM OF THE SCREEN"

```



```

79 PRINT"YOU CAN FIRE USING THE RED BUTTON"
80 PRINT"BUT WATCH OUT THE LAUCHER USES THE LATEST"
81 PRINT"ANTI-MATTER BEAMS WITCH PASS THROUGH THERE TARGET TO HIT MORE
"
82 PRINT"TO LAUCH ONE OF THE FOUR SCIENTIST PULL BACK ON THE JOYSTICK"
88 FOR T=1 TO 8000: NEXT T
99 GOTO 121
101 POKE 56, 28: POKE 52, 28
102 FOR T=7168 TO 7168+184: READ A: POKE T, A: NEXT
103 DATA 0,0,0,0,0,1,3,7,0,0,0,0,0,255,255,255
104 DATA 1,3,15,15,255,255,255,255,128,192,240,240,255,255,255,255
105 DATA 0,0,0,0,128,192,224,15,31,63,255,31,31,15,15,255,60,60,255,255,255,25
5,255
106 DATA 255,204,204,255,255,255,255,255,240,248,252,255,248,248,240,240,7,7,3,3
1,1,0,0
107 DATA 192,192,128,128,128,0,0,0,7,7,7,0,0,0,0,0,224,224,224,0,0,0,0,0
108 DATA 3,3,1,1,0,0,0,0,224,224,192,192,128,128,0,0
109 DATA 0,42,42,255,42,42,0,0,0,84,84,255,84,84,0,0
110 DATA 34,85,85,149,8,0,0,0
112 DATA 0,28,28,8,62,8,20,34
113 DATA 0,24,24,36,66,255,255,54
114 DATA 0,0,16,16,16,16,0,0,0
115 DATA 56,126,255,126,254,248,60,8
116 DATA 126,90,255,189,189,36,66,36
120 FOR I=7424 TO 7431: POKE I, 0: NEXT I: RETURN
121 PRINT "LOAD "
160 POKE 198, 3: POKE 632, 19: POKE 633, 13: POKE 634, 13

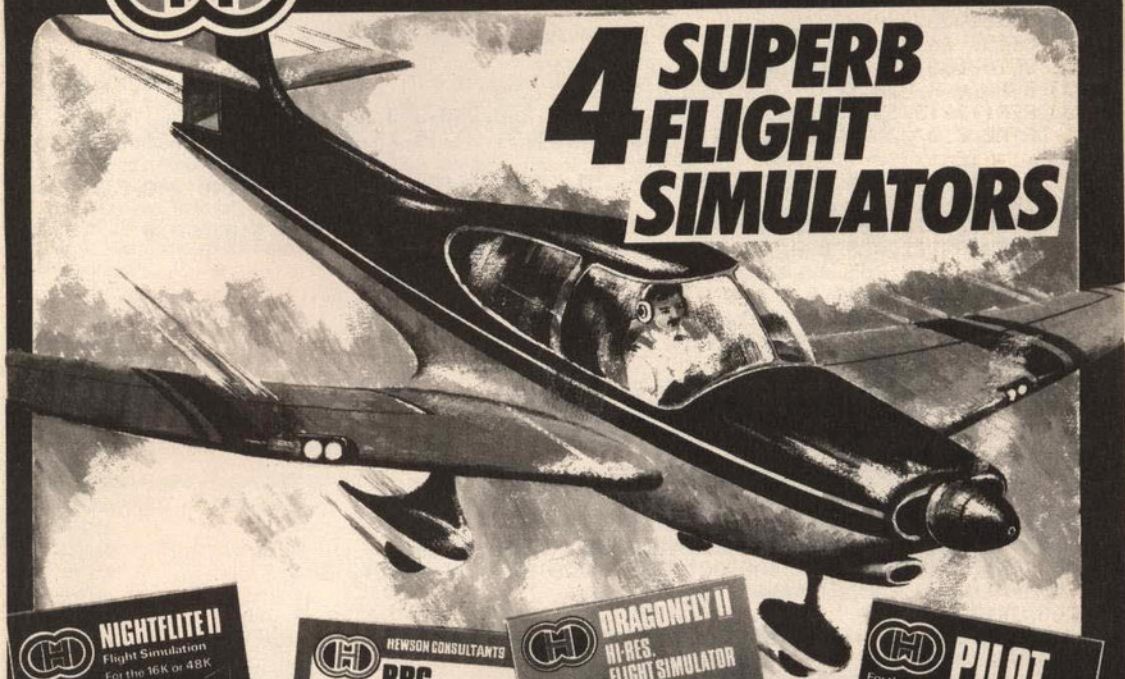
0 REM****VARIABLES****
1 A$="XXXXXXXXXXXXXXXXXXXXXXXX": X=10: CR=25: LI=4: ZX=20
2 D$="X": V=0: M=0: TI$="000000": COL=30720: SC=0: YT=0: GG=0: S=0
10 REM****MAIN ROUTINE****
11 GOSUB 100
15 GOSUB 6000
16 GOSUB 10000
17 IF V=1 THEN M=M-1: GOSUB 10000
18 IF V=2 THEN M=M+1: GOSUB 10000
20 PRINT "TIME: "; RIGHT$(TI$, 3)
21 PRINT TAB(10); "SCORE "; SC
29 REM****SET UP PHASES****
30 IF TI$ > "000199" THEN 60000
40 IF TI$ = "000100" THEN POKE 36879, 8: ZX=10: S=1
41 IF TI$ = "000125" THEN POKE 36879, 42: ZX=5
42 IF TI$ = "000145" THEN POKE 36879, 27: S=0: ZX=20
43 IF TI$ = "000155" THEN POKE 36879, 93: ZX=5: S=0
50 GOTO 15
99 REM****SET UP SCREEN****
100 POKE 36869, 255: POKE 36879, CR
1000 PRINT "X": FOR T=8164 TO 8185: POKE T, 230: POKE COL, 230: POKE T+COL, 6: NEXT
1002 DEF FNR(X)=INT(RND(1)*X+1): FOR I=1 TO 50: A=FNR(395)+7702
1003 POKE A, 174: POKE A+30720, FNR(6): NEXT
1040 PRINT ATAB(11); "S"
1045 FOR I=1 TO 20: A=FNR(40)+7834: POKE A, 171: POKE A+COL, FNR(6): NEXT
1050 FOR I=1 TO 35: A=FNR(100)+7966: POKE A, 21: POKE A+COL, INT(RND(3)*8): NEXT
1052 FOR I=1 TO INT(RND(1)*20): A=FNR(40)+7834: POKE A, 22
1053 POKE A+COL, FNR(6): NEXT
1055 PRINT "XXXXXXXXXXXXXXXXX"
1056 PRINT "X"
1057 IF LI=4 THEN PRINT "RRXXXXXXXX": RETURN
1059 IF LI=3 THEN PRINT "R XXXXXX"
1061 IF LI=2 THEN PRINT " XXXXXX"
1063 IF LI=1 THEN PRINT " XXXXXX R"
1065 IF LI=0 THEN PRINT " XXXXXX "
1067 GOTO 4000
1070 A$="ALL YOUR MEN HAVE GONE": GOTO 20000
1080 END
2000 A$="YOU HIT YOUR SHIP SO IT FIRED BACK."
2001 GOTO 20000

```




HEWSON CONSULTANTS

4 SUPERB FLIGHT SIMULATORS



NIGHTFLITE II

New all machine code version of our highly successful flight simulator. Now with perspective cockpit view, improved instruments, detailed map, four beacons and other enhancements. Multiple levels of play to develop your flying skills. Complete with printed flight debrief at the end of your flight — signed by the program author. The most realistic simulator on the market. 16K or 48K Spectrum.

£7.95

ALSO HEATHROW AIR TRAFFIC CONTROL

For the 16K Spectrum. YOUR TASK: To direct incoming aircraft from holding stacks to runway — smoothly, safely and expeditiously. YOUR INSTRUMENTS: Radar screen showing aircraft call signs, blips and trails. Four stack displays giving altitude, heading, speed and size.

£7.95



BBC NIGHTFLITE

Take the controls of your computer and fly by night over mountains to a safe landing. Take off, bank left and right, navigate between beacons, adjust the flaps and the rudder. A careful simulation of the deliberate operation of flying a plane. Unrealistic speeds and altitudes cannot occur because your plane will crash.

BBC Model B

£6.95



DRAGONFLY

Hi Res. Real time flight simulation. Two runways, take off, bank, adjust trim, navigate between beacons and land. Superb cockpit display of dials and readouts. Instruments: Alt, ASI, VSI, AH, ILS, TS, RPM, GAS, TEMP, HDG, BCN, BRG, FLAP and GEAR. Simply the BEST flight simulator for the Dragon.

£6.95



PILOT

Fly your ZX 81. Take off, climb, bank, adjust engine RPM. Navigate between beacons. Instruments include AH, ALT, HDG, FLAP, GEAR, VOR, VSI, WIND, DME, ADF, and ILS.

£5.95

ALWAYS LOOK FOR THE
HEWSON LOGO ...
THE MARK OF
THE BEST SOFTWARE



Available from
BOOTS
JOHN MENZIES
SPECTRUM
and all leading
micro computer
software retailers.

Distributed by
Micro Dealer
Personal Computer Services
Computer Bookshop
Lightning
Wynd-Up
Leisuresoft
Websters
Mapsoft

SORRY HUGHY
TRY AGAIN




```

3999 REM****LAUNCH MEN****
4000 IFYT>4THEN1070
4004 MI=8120+X+1:NI=MI+COL
4005 GOSUB10000
4006 GOSUB30004
4007 POKEMI,Q:POKENI,0
4009 MH=5:GOSUB6000:MH=0:POKEMI,32
4011 MI=MI-44:NI=NI-44:IFMI<7768THENRETURN
4012 GOTO4005
4050 END
6000 REM****JOYSTICK****
6001 POKE37137,0:POKE37154,127
6002 U1=PEEK(37137):U2=PEEK(37152)
6003 IF(U1AND4)=0ANDMH<5THENYT=YT+1:LI=LI-1:Q=18:GOTO1055
6008 IF(U2AND128)=0ANDX<18THENX=X+1:GOTO6500
6010 IF(U1AND16)=0ANDX<3THENX=X-1:GOTO6500
6013 IF(U1AND32)=0ANDGH<5THEN8000
6016 RETURN
6500 PRINTA$;TAB(X)" S "
6509 RETURN
6900 POKEBP,8:POKEBC,10:POKE36877,190:FORI=15TO0STEP-.2
6901 POKE36878,I+144:NEXT:POKE36877,0:POKE36878,8:POKEBP,32
6909 RETURN
7999 END
8000 REM****FIRE****
8001 BP=8120+X+1:BC=BP+30720
8002 GOSUB30000
8003 POKEBP,20:POKEBC,S
8005 GH=5:GOSUB6000:GH=0:POKEBP,32
8006 BP=BP-44:BC=BC-44:IFBP<7702THENRETURN
8007 GOTO8002
8900 REM
10000 REM***MOVE MOTHER SHIP***
10001 PRINTD$;TAB(M)" @ABCAD X##### EFGGFH X##### IJKLMN "
10002 FORT=1TOZX
10003 IFM<1THENV=2
10004 IFM>14THENV=1
10005 POKE36878,15:POKE36876,220:FORL=1TO5:NEXTL:POKE36876,0:POKE36878,0
10006 RETURN:END
20000 POKE36878,15:FORXX=15TO0STEP-3:POKE36880,RND(1)*3+11:POKE36881,RND(1)*2+3

20001 POKE36877,160+XX:FORDE=1TO10:NEXTDE,XX:POKE36877,0
20010 PRINT"3":POKE36878,8
20011 GOTO40000
28888 END
29999 REM**SCREEN DETECTION**
30000 IFPEEK(BP)=21THENS=SC+100:GOTO6900
30001 IFPEEK(BP)=171THENAA$="YOU HIT A MINE":GOTO20000
30002 IFPEEK(BP)=120RPEEK(BP)=130RPEEK(BP)=14THEN2000
30003 IFPEEK(BP)=22THENS=SC+10:GOTO6900
30004 IFPEEK(MI)=90RPEEK(MI)=100RPEEK(MI)=11THENS=SC+100:GG=GG+1:GOTO6000
30005 IFPEEK(MI)=120RPEEK(MI)=13THENS=SC+100:GG=GG+1:GOTO6000
30006 IFPEEK(MI)=21THENS=SC-100:Q=32:RETURN
30007 IFPEEK(BP)=110RPEEK(BP)=100RPEEK(BP)=9THEN2000
30008 IFPEEK(MI)=171THENQ=32:AA$="YOU HIT A MINE":GOTO20000
30009 IFPEEK(MI)=22THENQ=32:SC=SC-100:RETURN
30010 RETURN
39999 REM****END ROUTINES****
40000 REM
40001 POKE36869,240:POKE36879,8:PRINT"3"
40002 PRINTA$
40003 PRINT"4BUT YOU GOT ";GG:PRINT"OF YOUR4 MEN SAFTLY OUT"
40004 PRINT"4AND SCORED";SC:PRINT" PTS."
40005 PRINT"4IN A TIME OF ";RIGHT$(TI$,3)
40008 FORT=1TO5000:NEXTT:PRINT"3"
40010 POKE36879,27
40011 END
50000 AA$="YOUR TIME IS UP":GOTO20000

```


TURN YOUR PROGRAMME UPSIDE DOWN

Now you can add another dimension to your games.
Swap direction, swap functions, confuse your friends.
In fact you can add almost any twist to your games with
Stonechip's Programmable Joystick Interface.

You can also listen to them
with Stonechip's Echo Amplifier.



£24.95

Programmable Joystick Interface. This also enables any Spectrum software to be used with a joystick, irrespective of which keyboard keys have been chosen for function.

Programming is easy using only a single switch. Switch one way to program and another way to play. No tapes to load or links to worry about — all programming is achieved by hardware. Used with Atari-compatible joysticks. Simply plugs into rear expansion port of ZX-Spectrum. No other connections to make, no additional power supply required.



£19.95

Echo Amplifier. How would you like to listen to the sound output from your ZX-Spectrum without ear strain? The Stonechip Echo amplifier can do this for you as well as easing the tedium of saving or loading of tapes and enlarging the range of tape recorder compatibility with the computer. The amplifier has volume control over a range adequate for most uses, and a tone control for harsh or mellow sounds. A switched interface removes the need to swap leads during 'SAVE'ing or 'LOAD'ing. Leads are left connected all the time and the desired function is selected on the three position switch by the user. Use of the 'CUE' facility enables an audio cue to precede the program being 'SAVE'd on tape, a decided advantage when searching through a multi-program tape. The Echo simply plugs into the Ear, Mic and Power sockets of the computer and does not require an additional power supply. The expansion port at the rear of the computer is left free for use with other peripherals and the unit is housed in an attractive case custom designed to complement the ZX-Spectrum.

**STONECHIP
ELECTRONICS**

Stonechip Ltd, Brook Trading Estate Deadbrook Lane Aldershot Hants. GU12 4XB. Tel: (0252) 318260

To Stonechip Electronics Unit 9, The Brook Industrial Estate Deadbrook Lane, Aldershot, Hants.
Telephone: (0252) 318260.
Please forward me the following products:
All prices are inclusive of VAT Post & Packing for U.K. deliveries (overseas add 15%).
Name: _____
Address: _____
DEALER INQUIRIES WELCOME
Delivery approx. 14 days



New from **SUNSHINE** Master your ZX Microdrive

programs, machine code and
networking by Andrew Pennell

Master your ZX Microdrive contains all the information you will ever need to use the ZX Microdrive to the full. Clearly explained, with many examples, it is equally suitable for the relative newcomer to BASIC through to the experienced machine code programmer.

Andrew Pennell has also included a full database file handling program to let you put the ZX Microdrive to practical use with your Sinclair Spectrum.

Look out for the Sunshine range in W.H. Smith's, Boots, John Menzies, other leading retail chains and through our national network of book shops and specialist stores. Dealer Enquiries: 01-437 4343

master your
zx microdrive



ISBN 0 946408 19 X

Please send me

☐ Master your ZX Microdrive at £6.95 each

I enclose cheque/postal order for £..... made payable to: Sunshine Books: 12/13 Little Newport St., London WC2 3LD.
Or phone your order through on Access Mastercard 01-437 4343

Name

Address

Signature

We can normally deliver in 4/5 days.

NOW FOR THE 48K ZX SPECTRUM MULTI-COLOURED SPRITE-GRAPHICS A new UTILITY program: Replace User Defined Graphics with Multi-Coloured Sprites and greatly improve your games.

FEATURES:

Demonstration program : Character Generator program : Instruction program.
Create any size characters up to full screen.
Choose colour, bright and flash for each character square.
Save character data : Create animated characters.
Beginners guide on how to use Sprites.

Remarkable Machine code routine prints Multi-Coloured Sprites instantly.
Unprints Sprites Fully restoring background.

Only £6 including p&p.

From: **B. SIDES SOFTWARE**

4 Willesden Road, Cefn-Glas, Bridgend, South Wales CF31 4RE

POPULAR
Computing
WEEKLY

Back
Issues

Almost all the copies of PCW that you missed can still be bought as back issues for only 50p, including postage and packing.
An index of the contents of the 36 issues published in 1982 is now available from the Publishers for only £1.20. It includes full details of all the programs, routines, reviews and news that you might have missed.

Please send me the following back issues at 50p each:

Total £.....

Please send me a copy of the 1982 PCW Index at £1.20 ☐

I enclose a cheque postal order for £.....

Name

Address

Please return to Back Issues, PCW, 12-13 Little Newport Street, London WC2R 3LD.

PARAMOUNT SOFTWARE

A Registered Trading Name
of Workstations Ltd.

CHOCABLOC - A fast moving, pure Machine Code action game, with Chocabloc our hero trying to sort out some Real Cool Choc Bars - until everything goes crazy and the action is on! Arcade standard. Fully featured. Excellent sound and graphics.
Keyboard or Joystick.

£6.50

VIC 20 16K Expansion.

OUTBACK - Can you use the very sophisticated defence set-up to beat off the cunning Swagmen? How long will you survive? Pure Machine Code action. Fully featured. Superb colour and graphics. Arcade. A game with a difference. Joystick.

£5.50

Any VIC 20

COUNTDOWN - Time is important. Accuracy essential. Courage mandatory. But above all, Nerve is the prime attribute needed for your mission as an agent in the crack S.M.U. A Superb Arcade/Graphical Adventure. Keyboard or Joystick.

£5.50

VIC 20 8K or 16K Expansion.

MEGAWARZ - Where does your fantasy go when your mind leaves your body? Megawarz will take you there you can be sure. High resolution, multi-colour graphics. Sprite graphics. Synthsound. Pure Machine Code action. Arcade standard. A magical planetary trip. Keyboard or Joystick.

£7.50

Commodore 64



Dragon 32

CASTLE OF DOOM Fully implemented graphical adventure. A compelling and devious plot which retains excitement and interest to the end - if you ever reach the end! An experience in adventuring not to be missed. It's user friendly too!

£6.50

JOGGER - Truly a jogger amongst joggers. If you have trotted with the rest, now run with the best. Machine Code action. Superlative sound. Creative colour. A quality programme from Paramount. Joystick. £5.50
Any VIC 20.

TRADE
ENQUIRIES

Tel: (0642) 604470

Paramount Software, 67 Bishopton Lane, Stockton,
Cleveland, TS18 1PU. (England)

Chocabloc	£6.50	<input type="checkbox"/>	Name.....
Outback	£5.50	<input type="checkbox"/>	Address.....
Countdown	£5.50	<input type="checkbox"/>
Jogger	£5.50	<input type="checkbox"/>
Castle of Doom	£6.50	<input type="checkbox"/>
Megawarz	£7.50	<input type="checkbox"/>

I enclose cash/cheque/P.O. for £.....

Overseas orders add £1.00 for airmail.

WRITING
**MARKETABLE
PROGRAMMES?**

Hitch your wagon to
PARAMOUNT. Send
for evaluation and
terms.

The legend continues

Graham Taylor looks at the men behind Valhalla — a Norse legend brought to life

To date, Legend Software has released one game — a game that, depending on which chart you believe, has occupied one of the top five positions since the day of its release and looks set to remain there all Christmas and beyond. The game is *Valhalla*.

For a game which is doing so well, surprisingly little has been heard about the company. But, romantics who like stories of 12-year-old whizz kids are going to be disappointed. *Valhalla* is the end result of nearly nine months of coding by a team of seven, the majority of whom are very experienced programmers.

The almost military operation was terminated by managing director John Peel. "The idea that we should do an animated graphics adventure goes back nearly two years. It really is the first logical step on the way to an interactive movie — something indistinguishable from a real film, except that you are one of the characters."

"The idea of interactive movies is pretty dramatic. We wanted a name for the company that would imply something romantic and grandiose — the name Legend was no accident, we spent days ploughing through dictionaries."

Valhalla has graphics and characters loosely based on Norse myth. Backgrounds depict forests, castles, caves and lakes and the characters are dressed with helmets and armour — as is appropriate to the theme.

In fact, though, such details were not decided until a very late stage of development: "They are incidentals really. We had outlined several different plots and *Valhalla* happened to be first. Once the Movisoft operating system was functional, aspects like shapes of character and types of background were mere detail."

It's Movisoft that ensures that *Valhalla* will be no one off. "Timing for *Val II* is less a matter of coding and more a question of market timing. Once demand for *Valhalla* has calmed down a bit and is ticking over

we'll issue it — I think we're looking at next spring."

Needless to say, *Val II* will not be called *Val II* but John would give away few details about it. "It won't be staggeringly different, but it will definitely be an improvement — we've learnt a lot from *Valhalla*."

John Peel has been involved in computer software for quite a while. He started Premier Publications, which later became Premier Microsystems — now familiar for a Dragon disc drive. He sold that company to set up another one familiar to Spectrum owners, Microl.

"Microl was an idea waiting for a computer. When the Spectrum was announced we were ready — the first product, *Use and Learn*, came out within days of the computer."

Microl was successful in an unspectacular way, and became the means of financing *Valhalla*. "The cost of *Valhalla* was at least £70,000 with all the development work and other outgoings. We were committed to selling a lot of programs to break even."



The company has already recouped its costs and more. "I'm afraid we have bought the obligatory black Turbo Porsche, but the rest will be ploughed back into other projects."

Legend will be licencing Movisoft to other companies. The hope is that it will become the adventure game equivalent of CP/M — so standard that many computer manufacturers will allow for its easy implementation on their new machines.

"What's important is the size of memory — 48K is more or less mandatory — but I don't anticipate many new machines having less than that."

"Movisoft is not really specific to the Spectrum's Z80 processor at all. We did it on that machine simply because we could and it has sold the most," adds John.

This is borne out by the fact that *Valhalla* will be issued on the Commodore 64 in

February: "The Commodore 64 version of the game will be similar to the Spectrum one, but obviously the graphics will be better. For one thing, the characters will be more than one colour and we should also be able to do more with the backgrounds."

The team responsible for *Valhalla* was Graham Asher, Richard Edwards,



Managing director John Peel

Charles Goodwin, James Learmont, Jan Ostler and John. Several of the team were ex-IBM employees. None of the team had ever played a computer adventure before starting on the project, although some were *Dungeons and Dragons* fans.

Jan Ostler was responsible for many of the overall themes and ideas and, particularly, the characterisation. "The first thing I did when work began in earnest was to buy every adventure game I could lay my hands on — I spent a fortune."

"I was amazed at the lack of professionalism — most of them were full of spelling mistakes and obvious bugs — the only exception was *The Hobbit*."

John agreed: "I was sufficiently impressed to have a technical analysis done on it — the gist of that was 'well yes, but we can do better'."

"If we have done better, I think it's down to working as a team, giving people different and separate responsibilities. It's really impossible to do a big project like this any other way — take the analogy with conventional movies, imagine one person being not only the cameraman and the director but also having to design his own camera."

The success of that design can be seen in the number of technical achievements in *Valhalla*. Two aspects are particularly interesting — the seeming independence of the characters and their ability to continue with what they are doing, not only as you watch, but even when you are typing in commands.



The character independence was achieved by a technique known in artificial intelligence circles as "fuzzy logic". This involves a deliberate smearing of fixed patterns, using random processes. Put simply, instead of saying "under condition X, Character Y will do Z", the situation is changed so that Y might not do Z under condition X although the character probably will.

"Actually it's nothing like as simple as sticking in a random number from time to time. Rather, there are multiple levels of generators controlling the events, some are predictable, others are not — we control how they interact."

The way action and input can occur at the same time — a technique known as concurrency — is less easy to explain.



Apparently, "the concurrency is achieved by using vectored interrupts in conjunction with registers and stack 'lookaside' copies," said John. Now you know.

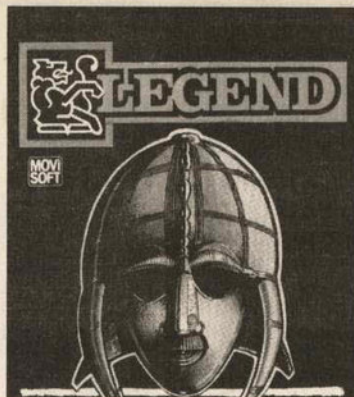
In keeping with its name, Legend's plans for the future are dramatic and grandiose. "We're waiting for the hardware to a certain extent, to get the kind of graphics we want to do, we need a lot more memory."

"We're also interested in the idea of speech. Quite honestly, the only thing stopping anyone from having a speech unit with decent human-like speech is that no one has got round to designing a new chip — everyone is still using the Texas chip, that's why they all sound like Daleks."

Another area that interests Legend is speech recognition. "It's not that difficult to get a computer to recognise speech, but it's difficult to do it under normal conditions, ie, when everyone shouts at once."

Assuming these problems are solved, John is very enthusiastic about the outcome. "With plenty of memory, plus good speech, plus speech recognition, there is no reason why there should not be a program visually indistinguishable from a tv picture with characters whom you can speak to and who will answer back — the potential market is enormous."

John actually sees a day in which there will be something like a video library, with all sorts of different interactive movies on all sorts of themes which people hire for



the evening. "You could have just as many themes as normal videos — cowboys, horror, science fiction and so on."

"A whole new kind of artistic talent might develop — if we can make Movisoft simple enough to operate so that only a small amount of actual programming knowledge is necessary, then creative people could use the system to design plots and characters like a scriptwriter or a director."

So far as the future is concerned John doubts that many of the micros being launched now will survive. "There are some nice machines, but quite honestly I don't see how they are going to survive — in this country Sinclair and Commodore have got it sewn up — or at least they have

if they choose to play rough. I don't think we'll see more than three or four manufacturers survive in the next few years — then we'll see the kind of standardisation under which systems like Movisoft can flourish."

Some of the lessons learnt from *Valhalla* will bear fruit in non-adventuring areas, says Jan. "There is no sensible reason why computers should be the province of males between 15 and 35, but people just haven't discovered how to write programs for women. We have something planned that will help to change that situation."

Legend are giving little away, but it seems such a project would involve some of the artificial intelligence techniques used in *Valhalla* to an even more sophisticated degree.

Legend seems a peculiar mixture of daydreamers, who've proved their dreams are at least partly possible, and fairly hard-bitten realists playing close attention to the market and its requirements. It may be that this mixture was a vital part of the success of the project.

John Peel sums up *Valhalla* in the following way: "I would call it a qualified success — certainly we've proved that a number of things are possible on a cheap home computer that everybody said were impossible. More than that, I think we've introduced the basic concept to people. Naturally there are a lot of things I would change about *Valhalla*, things which could have been done better even on a Spectrum — wait until the next one."




BETTER SOFTWARE AT BETTER PRICES

PO BOX 107, UXBRIDGE, MIDDLESEX UB8 3NR

<p>COMMODORE 64</p> <p>ANIROG Scramble, Hexpert, Moon Buggy, Frogman, RRP £7.95 Our Price £5.95. INTERCEPTOR Siren City, Token of Gaul, Frogger, Crazy Kong, RRP £7.00 Our Price £5.00. QUICKSILVA Purple Turtles, Aquaplane, RRP £7.95 Our Price £5.95. LLAMASOFT Hover Bover, Mutant Camels, RRP £7.50 Our Price £5.50. ARCADIA 64 now available. THE HOBBIT now available.</p> <p>VIC20</p> <p>LLAMASOFT Megagalactic Llama's, RRP £8.00 Our Price £5.50. ULTIMATE Jet Pac, RRP £5.50 Our Price £4.95.</p>	<p>DRAGON</p> <p>MICRODEAL New releases: Space Fighter, Dragon Hawk, Devil Assault, Scramble, Pinball, Glaxons, Eightball, Frogger and all other titles, RRP £8.00 Our Price £7.75. Imagine, Legit now available</p> <p>SPECTRUM</p> <p>ULTIMATE Altic Atak, Lunar Jetman, RRP £5.50 Our Price £4.94. OCEAN Mr Wimpey, Armeddemon, Kong, RRP £6.50 Our Price £5.95. CRYSTAL Bodysnatchers, Rommels Revenge, RRP £7.50 Our Price £5.50. VALHALLA RRP £14.95 Our Price £13.95. STONKERS, ALCHEMIST now available.</p>
---	--

SEND CHEQUE OR P.O. OR SEND 12/7p STAMP FOR OUR NEW 12-PAGE CATALOGUE. OUT NOW! FREE CATALOGUE SENT WITH EVERY ORDER



**Publishers of
Popular Computing Weekly,
Dragon User,
Commodore Horizons
and
Micro Adventurer**

AUTHORS

Sunshine already publishes a highly acclaimed and best selling list of computer books.

But we are always looking for new ideas and new authors.

If you have an idea and think you could write a good book why not write to us and find out what we can offer?

**David Lawrence, Book Editor, Sunshine,
12/13 Little Newport Street, London WC2R 3LD**

SOPHISTICATED GAMES FOR VIC20

VIC CRICKET. Realistic game of skill and luck with all the major rules of cricket correctly interpreted. Full scorecard, printer and game save facilities. Needs 16K expansion £5.99.

LEAGUE SOCCER. League championship game for two to 22 teams/players. Automatic fixtures, full action commentaries, match facts. League tables, results check, postponed games, etc. Non league matches also playable — the VIC will even make the cup draw. Printer and game save. Needs 16K expansion, £5.99.

WHODUNNIT? Twelve guests have gathered for drinks at Murder Manor. However one of them has more than drinks on his mind. Thrilling detective game for one to six players, with genuinely different murder every time. You can even rename the suspects! Needs 8K expansion, £4.99.

TOP OF THE POPS. Money making game about the music business. Make your own records and see them climb the chart. Printer and game save facilities. Needs 8K expansion, £4.99.

VIC PARTY 4. Contains MASTERWORD, A DAY AT THE RACES, GAME X (Strip Poker), and CONSEQUENCES. Four games ranging from the serious to the ridiculous. All good fun — nothing offensive. Needs at least 3K expansion. £5.99.

Available from

SOPHISTICATED GAMES, Dept. PCW, 27 Queens Road, Keynsham, Avon BS18 2NQ. Tel: 02756-3427.

WRITE FOR DETAILS OF OUR FULL RANGE

*P&P free (U.K. only). All games sold subject to our conditions of sale, which are available on request.

TWO GREAT NEW GAMES FOR THE 16/48K SPECTRUM

AMPERA FOR THE ARCADE ENTHUSIAST

The Amperas, aliens from another world, have invaded and are trying to drain the city's power. As the gridrunner, your job is to link the power lines to light up the city. But beware, the Amperas are highly charged and can kill!!!

Ten levels, Demo mode (48K only) £5.90 each
(Keyboard or Joystick)

SPECTRAL REPEAT FOR THE WHOLE FAMILY

A mind teaser, based on the proven game Simon, but faster and increases in speed, taxing your wits to the full. Your score/high score facility

£4.90 each

TRADE ENQUIRIES WELCOME

PLAZASTAR LTD.
SEYWARD HOUSE, ABINGDON ROAD
NUFFIELD TRADING ESTATE, POOLE, DORSET

In the driving seat

Graham Taylor looks at three games designers and compares the results

Does the following pattern sound familiar? You buy a computer after months of planning and saving. For a while you play with it avidly, you even learn a reasonable amount of Basic programming. There follows a period of increasing disenchantment as you realise that your own programs are never likely to reach the standards of the top software houses — gradually your computer gets left on the shelf more and more, a sad, lonely sight.

What we all hope to get from having a computer is a kind of technological Lego — an endlessly changeable toy. The problem is that just buying commercial programs doesn't bring the satisfaction of creating them yourself.

If this does sound familiar, then now is the time to bring out your machine from the top shelf and dust it down. The fun may come back to computing — the games designers have arrived.

These packages allow you to create your own games, using various kinds of menus or special languages. The result is a far more professional game that is faster than anything written in Basic. The price you pay is some degree of restriction in the kinds of game you can create.

Although the packages reviewed here are predominantly Spectrum-based, you can expect to see similar programs being made available for other machines shortly.

To begin with though, *CoCo II*, a program for the Vic20 that's been around for quite a while, but hasn't been distributed

widely in this country.

You design your game in two distinct sections — *Player* and *Opponent*. Within each section you use a simple, Basic-like, language to determine the pattern of movement and the score values. Movement is by a minimum of four pixels at a time, which means that the end result is bound to be fairly jerky.

The language is easy to use: the eight points of the compass are assigned numbers, with one extra number for 'track', ie, for the opponent and player to follow one another. Movement is then a matter of a series of commands like *Move 1 5*, *Move 4*, *12* etc meaning SW for 5, 4 pixel units, then W for 12 units.

Shapes are designed using a simple user-defined graphics generator, operated by joystick — you just fire to turn a pixel on or off. The program comes with an extensive manual and one sample game which, unfortunately, doesn't really show the program off at its best.

The problem with *CoCo II* is that the end results are rather disappointing — they are not really very much better than you could do with only a limited knowledge of Basic — the only exception to this being the ease with which you can create shapes, but then there are plenty of programs around to help you do that for far less money.

In terms of the quality of the end result, *Games Designer* from Quicksilver is a far more impressive package. The program

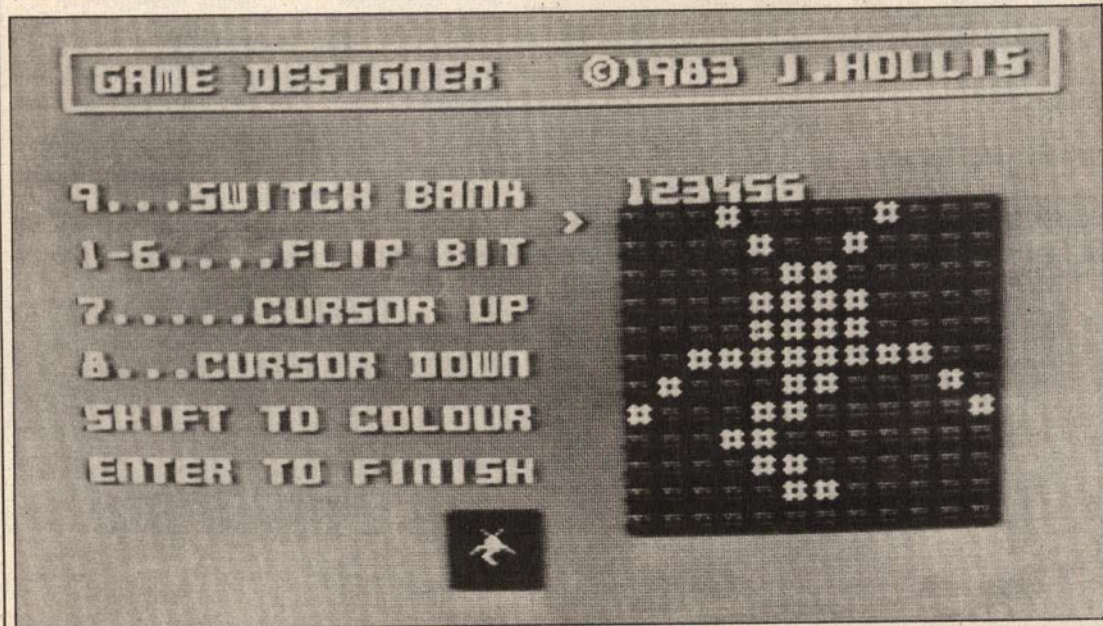
comes with eight ready-made games, any of which might have been marketed successfully in its own right in the early days of Spectrum games.

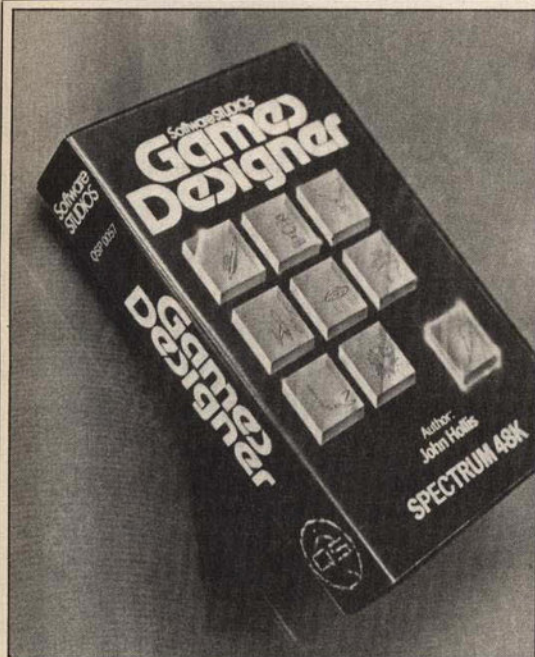
The main reason for the quality of the games is the provision of a sprite generator within the program — independent graphic shapes whose movements can be individually defined. Sprite movement is smooth and fast and is the basis for most arcade machines. Using simple cursor controls any shape may be assigned, up to 32 sprites, as may any colour.

Any of four game formats can be selected — *Invaders*, *Defender*, *Asteroids* or *Beserk* type. The difference between the game lies in the screen layout and the position and manoeuvrability of the missile base/spacehip; eg, *Invaders* format gives you a base at the bottom of the screen, with waves of aliens attacking from the top, and base movement limited to left and right. In *Asteroids* format, the spaceship is placed centre screen with the enemy swirling around it — the base can move in all directions.

Using a series of menu options, sounds can be assigned to shapes using a simple but effective sound generator. The movement and attack waves are selected — ie, how many aliens move where and at what time. Movement is almost infinitely variable and is programmed in a similar way to *CoCo* with numbers assigned to directions. A line display shows you the pattern of movement you are creating.

Other options on the menu allow for a star background and optional features like whether or not your ship has a shield. You may also select which, if any, of your waves of attackers are able to fire back at you.





One of the most impressive features of the *Games Designer* is the animation of the aliens. By designing two appropriate sprites, a menu option allows you to switch quickly between them — thus, space invaders can wave their arms threateningly, or spheres can appear to spin.

If you like fairly straightforward alien bashing, then *Games Designer* is for you — you really can create games as good as those available commercially, but to your own specifications. The only criticism I would make is that you really don't have much choice over the basic structure of each game, since you must adopt one of the four predetermined formats.

As proof that the idea of programs for creating games aren't limited to arcade-style games, Gilsoft have now released *The Quill* — a program for constructing text adventures.

To use *The Quill* properly requires some effort and some experience — it is abso-

lutely essential to go through the examples in the manual. But, although it requires the most effort to get a tangible result, *The Quill* is perhaps the most satisfying of all the programs mentioned.

The program again works by the use of menus. It is vital to plan out your adventure completely before you start — decide how many rooms there will be and where they will be in relation to one another; eg, bathroom west from bedroom, etc. You also need to decide what objects are located where and what conditions must be met to solve various obstacles, eg, the torch must be switched on before you go down to the cellar otherwise you fall and break your neck.

Using the menu, you enter the text associated with each room and the objects found there. The most difficult section is



the list of acceptable verbs, this includes not only those vital to the plot, eg, 'Kill vicious monster' but other inputs to which you want the game to respond with something other than "I don't understand..."

The crux of this input response is the use of flags — put simply these are 29 on/off switches used to determine various courses of action; eg, you may decide that flag 15 is set on when someone picks up the screwdriver. Later on, opening a safe may depend on whether or not you have the screwdriver; ie, is the flag set or not? It's not difficult to use, but it does require logical thought, particularly if you want to create brain-teasing puzzles in the game.

For an adventure fan, possibly the only thing more satisfying than solving puzzles is creating your own and watching someone else trying to solve them — particularly when you can populate your adventure with people and places known to those likely to try and solve it. Gilsoft will even let you market your *Quill*-written adventure — they only ask for a mention. *Quill* supplies the programming (in machine code), all you have to provide is some thought, planning and perseverance.

Despite the odd reservation, all these packages can be recommended. They might breathe new life into your micro, merely by putting you back in the driving seat and letting you find out what you can do.

Firm	Program	Cost
Gilsoft 30 Hawthorn Road Barry South Glamorgan CF6 8LE	<i>The Quill</i>	£14.95
Games Designer Software Studios Quicksilver 13 Palmerston Road Southampton Hampshire	<i>Games Designer</i>	£14.95
Mapsoft (Distributors) Unit A Oak Road South Hadleigh Benfleet Essex SS7 2BB	<i>CoCo 2</i>	£19.25

NOW YOU CAN LIFT STATIC DRAWINGS, PHOTOGRAPHS, ETC RIGHT OFF THE PAPER AND BRING THEM TO LIFE INTO YOUR PROGRAM!

FROM PAPER TO SCREEN...
...AND INTO YOUR PROGRAM.

POWER GRAPHICS

ACTION-TRACER + GHOST-WRITER
LARGE-TRANSFER SYSTEM PROGRAM COMPILER

TWO POTENT FEATURES COMBINE TO BRING YOU UNIQUE NEW POWER OVER YOUR SPECTRUM GRAPHICS!

● **ACTION-TRACER** Gives you the power to transfer drawings, photographs, paintings, lettering—in fact ANY paper-based images into full colour line drawings on your Spectrum screen, with astonishing ease and an accuracy that rivals expensive digital tracers. But this time you get more than just a static on-screen design that has to be laboriously drawn on and off tape, because...

● **GHOST-WRITER** Interprets your on-screen design into the precise sequence of Basic instructions needed to EXACTLY reproduce it, and then writes the program for you, directly into memory! New program lines appear in your listing which are indistinguishable from ones you might have written yourself. When you've finished, POWER-GRAPHICS will 'self-destruct', leaving behind only your new program lines ready to use.

● **TOGETHER THEY'RE DYNAMIC!** The new program captures your design DYNAMICALLY, giving you instantly the power to MOVE it anywhere, to SHRINK it down to a single pixel, or EXPAND it to fill the screen. You can SQUEEZE or STRETCH it into weird distortions, flip it UPSIDE DOWN or MIRROR-IMAGE it, ROTATE it in the plane of the screen... In other words MANIPULATE IT UNDER YOUR FULL CONTROL!

Once GHOST-WRITER has captured Space-Shuttle, you can immediately reproduce it anywhere, any size, AND redesign it too!

No problem producing mirror-images... and turning them upside-down is just as easy, too!

Drawing a simple cross-section (above left) and rotating it through the plane of the screen to produce exotic architecture is just a peep into a whole new world of exciting, inventive graphics made easy as ABC by GHOST-WRITER's versatile programming.

ANIMATION OR MANIPULATION — IT'S ALL THE SAME TO POWER-GRAPHICS

Switching individual parts of a design is easy, and thanks to POWER-GRAPHICS' ability to produce high-speed curves, which DRAW as fast as straights, even curved shapes can be animated in real-time—like the lips of this well-known newsreader (recognise her?).

FUN TO USE, SIMPLE IN OPERATION, POWER-GRAPHICS IS AN IMPORTANT NEW TOOL FOR BEGINNERS AND ADVANCED USERS ALIKE, AND EXTENDS THE SPECTRUM'S POTENTIAL INTO EXCITING NEW REGIONS.

NO EXTRA HARDWARE NEEDED! ALL YOU NEED IS...

**POWER
GRAPHICS**

ZX SPECTRUM
FOR 16K OR 48K
ONLY £8.95

IF YOU WANT PICTURES YOU CAN USE, IT HAS TO BE

SHEER MAGIC!

THE POWER TO PRODUCE STUNNING TOP-QUALITY TEXT DISPLAYS FOR IMPRESSIVE PROGRAM OR VIDEO TITLES, OR ADVERTS, LETTERHEADS, ETC.

LOOK HOW EASY IT IS:

- * 4 movement-keys let you SET the 'Magic Window' to ANY rectangular shape and size, then MOVE it to any screen position.
- * ANY LINE OF TEXT NOW ENTERED WILL BE PRINTED TO EXACTLY FILL THE SHAPE USING CURRENT COLOUR AND ATTRIBUTE SETTINGS.
- * SETTINGS are always on display below the screen. Change and test-view your text in new colours etc. in SECONDS!
- * PAINTBRUSH CURSOR will 'paint-in' detail effects, sketch with any character, or position lines of normal text.
- * PRE-SET UDG's let you produce shimmer-effect borders, panels, etc. in new colours such as orange, pink, purple, etc., etc.
- * LABEL command prints standard cassette label shape, ready for you to add text. Prints out true-to-scale on ZX printer.
- * BANNER-WRITER MODE prints text sideways on ZX printer in the form of a huge banner, the height of each letter being full paper width.

SPECTRUM TYPESETTER 16/48K £4.99

GRAFFIX User-defined graphics made ultra-easy. Totally user-friendly. Continuous menu display of multi-functions. Whatever you think you might want to do, this program does it at a keystroke! PRODUCES UDGS THAT SCREENS WILL RECOGNISE!! Sheer convenience for only **£3.99**

SOUNDS FANTASTICI

Superb sound effects from your Spectrum have never been so easy!

- * YOU conjure up your own unique sound-designs on the graphic synthesizer control panel.
- * AUTO-SONICS will instantly turn them into automatically compiled Basic program lines that will reproduce each sound again and again IN YOUR PROGRAM!
- * 26 built-in effects include animals, engines, siren, phone, Monster growl, space sounds... etc... etc...

Just the job... the effects are excellent! Personal Comp. World

BUTTERCRAFT SOFTWARE

SPECTRUM AUTO-SONICS

SOUND EFFECTS

26 original sound effects including: 20 animal sounds, 20 engine sounds, 20 siren sounds, 20 monster growls, 20 space sounds, 20 other sounds.

PLUS: An on-screen 'synthesizer' control panel that lets you create your own unique sounds.

16 or 48K

WINNER OF PCW "WHIZZ-KID '82"

"... a very powerful program... the ease of use amazes me — it is so simple to alter and amend the sound... Well done BUTTERCRAFT — this is an excellent programming tool." (Educational Computing Dec. 82)

16K or 48K
£4.99

CHRISTMAS RED ALERT!! GUARANTEED 1st CLASS SAME DAY DISPATCH!!

BUTTERCRAFT SOFTWARE

14 Western Avenue, Riddlesden, Keighley, Yorks. ENGLAND

PLEASE DEDUCT 50p DISCOUNT ON 2nd AND SUBSEQUENT ITEMS ON YOUR ORDER

OVERSEAS CUSTOMERS
ADD £1.00
EXCESS POSTAGE

POPULAR COMPUTING WEEKLY



VALHALLA

One hundred and eighty

Andy Wilson concludes his series on structured programming for the ZX81

Last week we looked at assembly language. I now hope to give a few more tips on using the routines.

As the procedures must be defined before they are called it is best to have all the procedure definitions at the beginning of the program. Alternatively, you could throw your scruples to the wind and use a *Gosub*, with the definitions at the end of the program.

Procedures can be called from within other procedures, or even iteratively; ie, a procedure can call itself, but keep one eye on the procedure stack!

One of the shortcomings of the routines is that parameters cannot be passed to and from procedures. We can, however, simulate this facility in the same way we might when using *Gosubs*, eg:

```
500 LET X = Y
510 LET XFACITORIAL = USR CALLPROC
520 LET Y = X
```

With an appropriate procedure *XFactorial* this will work out the factorial of *Y*, or any other variable we may wish to use.

Listing 7 is an example of a full program written using the routines. It is supposed to simulate the electronic darts scoreboards often seen in pubs. It has the advantage that the score of each dart can be entered individually, with a constant display of the running scores, and the current thrower's round score and score needed to finish.

You will, I hope, notice the total absence of the dreaded *Gotos* and *Gosubs*. You will also, in all probability, notice the lack of the explanatory REMs whose virtues I extolled

earlier. This is a deliberate move intended to show how easy it can be to follow the gist of a reasonably structured program.

Although I have not used REMs to actually explain the program, I have used them to help clarify the structure. REMs followed by a line or more of spaces are used to separate parts of the program, while REMs followed by graphic shifted 7s are used to underline procedure names.

The program was written 'top down'; that is the outline of what procedures would be needed, and how they would relate to each other, was decided before any actual code was written. Naturally this outline has often changed by the time a program is complete, but this method still helps make it easier to understand. You should get a rough idea of how the program works simply by looking at the procedure names and where they are called.

Nevertheless, I expect some explanation of the program would not go amiss. If you intend to type in the program I suggest you do so first, after *Loading* the machine code of course, then *Run* it. This should make things much clearer.

I will give a brief explanation of each procedure, in reverse order, starting with: *Intro*: I hope you can guess what this does.

Called by the main program.

Scrollup: as the name suggests scrolls the screen up one line, keeping the current print line the same. The top line, *T\$,* is reprinted so we don't lose it. Note the *Print* after *Scroll* to avoid upsetting the

display. Called by *Play*.

DartIn: checks the score entered is, in fact, a possible dart throw, and sees if it is a double or treble. Called by *ScoreIn*.

ScoreIn: inputs the score and converts it from a string to an integer. Called by *Round*.

Round: gives a player three throws, adds each dart to the round score and takes it away from the score needed to win. It then makes sure the player hasn't 'bust'. Called by *Play*.

Play: firstly looks at the print line to see if the screen needs scrolling. It then plays a *Round* for each player. If the player hasn't bust it updates the score and prints the new one. Called by the main program.

Win: if a player's running score is 0 and his/her last dart was a double or a bull we call *Win*. A polite message is printed, a note is taken of who won, *I* is set to 2 in order to leave the *For* loop, and the *Won* flag is set. Called by *Round*.

Main Program: starts by calling the *Intro* procedure and setting up two strings for the headings and spaces. The rest of the program is repeated until the reply to the "Play Again?" prompt is not 'Y'. After initialising the variables and the screen we keep *Playing* until the *Won* flag is set.

Presuming you know how to play darts that should have been quite easy to follow. I hope you have found these articles interesting and maybe even useful. If you were looking for tips on saving memory or speeding up your games you have read the wrong articles, but if you've got this far you must have got something from them, and any comments or even criticisms, constructive of course, would be very welcome.

LISTING 7

EXAMPLE PROGRAM

```
100 REM **DARTS SCOREBOARD**
=====

20 LET PLAY = USR DEFPROC
30 REM
40 LET LINE = LINE + 1
40 IF LINE = 18 THEN LET SCROLLU
P = USR CALLPROC
50 FOR I = 1 TO 2
60 LET ROUND = USR CALLPROC
70 LET S(I) = S(I) - (ROUND SCORE A
ND NOT BUST)
80 PRINT AT LINE, I * 10; S(I)
90 NEXT I
100 RAND USR ENDPROC
110 REM

200 LET ROUND = USR DEFPROC
205 REM
210 LET ROUND SCORE = 0
220 PRINT AT 19, 0; "PLAYER " I; "
Y = 230 LET BUST = 0
240 LET DARTS = 0
250 RAND USR REPEAT
255 PRINT AT 20, 0; "YOU NEED " T
AB 4; S(I) - ROUND SCORE; " "
260 LET DARTS = DARTS + 1

270 LET SCOREIN = USR CALLPROC
280 PRINT AT 19, DARTS * 4 + 8; D$
290 LET ROUND SCORE = ROUND SCORE + D
ARTS SCORE
300 IF S(I) - ROUND SCORE < 2 THEN L
ET BUST = 1
310 IF S(I) - ROUND SCORE = 0 AND (M
ULT = 2 OR DARTS SCORE = 50) THEN LET
WIN = USR CALLPROC
320 PRINT AT 19, 25; (STR$ ROUND S
CORE) AND NOT BUST; "BUST" AND BU
ST AND NOT WON
330 POKE UNTIL DARTS = 3 OR BUST
340 RAND USR CHECK
350 FOR F = 1 TO 30
360 NEXT F
370 PRINT AT 19, 0; S$; TAB 0; S$; T
AB 0; S$
380 RAND USR ENDPROC
390 REM

400 LET SCOREIN = USR DEFPROC
405 REM
410 RAND USR REPEAT
420 LET ERROR = 0
430 INPUT D$
440 LET DARTIN = USR CALLPROC
450 POKE UNTIL NOT ERROR
460 RAND USR CHECK
470 LET DARTS SCORE = VAL D$ * MULT
480 LET D$ = C$ + D$
490 RAND USR ENDPROC
495 REM

500 LET DARTIN = USR DEFPROC
505 REM
```



```

510 IF D$="" THEN LET D$="999"
520 LET MULT=1+(D$(1)="D")+2*(D$(1)="T")
530 LET C$=D$(1) AND MULT>1
540 IF MULT>1 THEN LET D$=D$(2)
550 FOR F=1 TO LEN D$
560 IF D$(F)<"0" OR D$(F)>"9" THEN LET ERROR=1
570 NEXT F
580 IF NOT ERROR THEN IF (VAL D$ AND VAL D$<25 AND VAL D$<20) OR (VAL D$>20 AND MULT>1) THEN LET ERROR=1
590 RAND USR ENDPROC
595 REM
600 LET WIN=USR DEFPROC
605 REM
610 PRINT AT 19,25;"YOU WON"
620 LET WINNER=I
630 LET I=2
640 LET WON=1
650 RAND USR ENDPROC
660 REM
700 LET SCROLLUP=USR DEFPROC
705 REM
710 SCROLL
720 PRINT TAB 31;" "
730 LET LINE=17
740 PRINT AT 0,0;T$
750 RAND USR ENDPROC
760 REM
800 LET INTRO=USR DEFPROC
805 REM
810 PRINT TAB 8;"DARTS SCOREBOARD"
820 TAB 8;"===== "
830 PRINT AT 5,0;"SCORES SHOULD BE ENTERED IN THE FORM SHOWN BELOW. E.G.:"
840 PRINT AT 8,0;"SINGLE 7"
850 PRINT AT 11,0;"DOUBLE 18"

```

```

20"="T20","OUTER BULL","="25"
"BULSEYE","="50"
840 PRINT AT 15,10;"PRESS A KEY"
850 PAUSE 4E4
860 RAND USR ENDPROC
870 REM
1000 REM *MAIN PROG STARTS HERE*
1005 LET INTRO=USR CALLPROC
1010 DIM S(2)
1020 LET S$=""
1030 LET T$=""
1040 RAND USR REPEAT
1050 CLS
1060 LET S(1)=501
1070 LET S(2)=501
1080 LET WON=0
1090 LET LINE=1
1100 PRINT AT 0,0;T$
1110 PRINT AT 1,10;S(1);TAB 20;S(2)
1120 RAND USR REPEAT
1130 LET PLAY=USR CALLPROC
1140 POKE UNTIL,WON
1150 RAND USR CHECK
1160 PRINT AT LINE,WINNER*10;"WON"
1170 PRINT AT 21,0;"PLAY AGAIN?"
1180 INPUT U$
1190 PRINT AT 21,0;S$
1200 POKE UNTIL,U$<"Y"
1210 RAND USR CHECK
1220 STOP
1230 REM
9997 REM **AUTO-RUN**
9998 SAVE "DARTS"
9999 RUN

```

PROGRAMMING AIDS AND LANGUAGES FROM ...

Audiogenic LTD

FOR COMMODORE VIC-20 AND 64!

VP052 BUTI PLUS - £39.95 - Basic Programming Aid Commands PLUS Machine Code Monitor PLUS 3K Expansion! Basic aids include - APPEND, AUTO, DELETE, DUMP, EDIT, FIND, HELP, RENUMBER, REPEAT, STEP, TRACE, UNNEW, VIC, and DEC to HEX. Monitor Commands - ASSEMBLE, DISASSEMBLE, CENTRONICS, FILL, GO, MEMORY, HUNT, REGISTER, PRINTED DISASSEMBLE, LOAD, QUICK EXECUTE, WALK CODE, SAVE, TRANSFER, EXIT.

VP074 MONITOR VIC - £19.95 - Monitor on its own. Commands as above.

SS074 MONITOR 64 - £29.95 - 64 version. Commands as above.

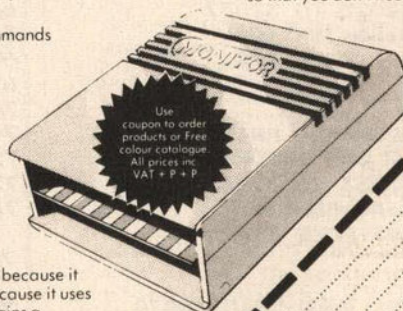
VP078 MIKRO ASSEMBLER - £48.95 - Cartridge Assembler program for the VIC - Includes 3K extra memory. Write your machine language source code on Basic Lines which can be manipulated using the included toolkit commands. MIKRO uses standard MOS mnemonics, and features ASSEMBLER and DISASSEMBLER, plus TIM monitor commands, and special hi-res, sound, and joystick extensions.

SS076 FORTH 64 - £29.95 - Audiogenic Forth is very fast because it compiles right down to machine code, and very compact because it uses special screen compression routines. Audiogenic Forth contains a dictionary of over 200 Forth words, but the great thing about Forth is that you can define your own commands! Audiogenic Forth gives you full error messages (instead of codes), a full scrolling screen editor, and a comprehensive manual.

VP076 FORTH VIC - £24.95 - As above, but includes special VIC colour and sound commands. This version must be used in a motherboard with 8K+ expansion.

VP076/M FORTH VIC (with memory) - £39.95

- As VP076, but includes 3K expansion built-in so that you don't need a motherboard and expansion.



PLEASE SEND ME
NAME ADDRESS

PRODUCT & CODE NO.

AUDIOGENIC LTD.,
P.O. BOX 88,
READING,
BERKS.



One page at a time

Richard Walton presents a modified print routine for listing programs

The Dragon List routine is inconvenient if a long program is to be edited. Although Shift @ can be used to stop the listing at any time, an automatic "paging" of the listing is much more convenient.

The accompanying program provides such a facility. It does this by intercepting the Dragon's normal routine.

An assembler listing is provided to show how the routine works. In addition, a Basic program is given for users who do not

have an assembler.

The program uses a number of useful addresses as follows:

H16A or 362: this is called by Basic whenever a key is pressed. The program intercepts this call. Normally this address contains a 57 code (Rts) but the program replaces this with a 126 code (Jmp).

H167 or 359: this is called whenever a character is printed. This is intercepted in the way described previously.

The Rom routine to get a character from the keyboard is also used. This is at address 41194.

When the Basic program is Run, the machine code is Poked into reserved memory from address 32001. The program contains a check on the Data statements and will stop if an error is found. The Pokes in lines 710 to 730 set up the interrupts which call the program.

The program can be called by pressing down-arrow key when required. A further pressing of the key returns to normal Basic print routine, which makes the running of programs more convenient.

When first entering and testing the program listing, leave out line 770 or you won't be able to alter it.

```

100 'IMPROVED DRAGON LISTING
110 'ROUTINE - R.WALTON.
120 '19/11/83
130 CLEAR 200,32000
140 FOR I=32001 TO 32008
150 READ A$:A$="&H"+A$
160 A=VAL(A$):POKE I,A
170 T=T+A
180 NEXT I
190 IF T<>439 THEN PRINT"DATA
    ERROR IN 620":STOP ELSE T=0
200 FOR I=32009 TO 32016
210 READ A$:A$="&H"+A$
220 A=VAL(A$):POKE I,A
230 T=T+A
240 NEXT I
250 IF T<>442 THEN PRINT"DATA
    ERROR IN 630":STOP ELSE T=0
260 FOR I=32017 TO 32024
270 READ A$:A$="&H"+A$
280 A=VAL(A$):POKE I,A
290 T=T+A
300 NEXT I
310 IF T<>789 THEN PRINT"DATA
    ERROR IN 640":STOP ELSE T=0
320 FOR I=32025 TO 32032
330 READ A$:A$="&H"+A$
340 A=VAL(A$):POKE I,A
350 T=T+A
360 NEXT I
370 IF T<>622 THEN PRINT"DATA
    ERROR IN 650":STOP ELSE T=0
380 FOR I=32033 TO 32040
390 READ A$:A$="&H"+A$
400 A=VAL(A$):POKE I,A
410 T=T+A
420 NEXT I
430 IF T<>521 THEN PRINT"DATA
    ERROR IN 660":STOP ELSE T=0

```

```

440 FOR I=32041 TO 32048
450 READ A$:A$="&H"+A$
460 A=VAL(A$):POKE I,A
470 T=T+A
480 NEXT I
490 IF T<>771 THEN PRINT"DATA
    ERROR IN 670":STOP ELSE T=0
500 FOR I=32049 TO 32056
510 READ A$:A$="&H"+A$
520 A=VAL(A$):POKE I,A
530 T=T+A
540 NEXT I
550 IF T<>965 THEN PRINT"DATA
    ERROR IN 680":STOP ELSE T=0
560 FOR I=32057 TO 32066
570 READ A$:A$="&H"+A$
580 A=VAL(A$):POKE I,A
590 T=T+A
600 NEXT I
610 IF T<>853 THEN PRINT"DATA
    ERROR IN 690 OR 700":STOP
620 DATA 20,01,12,B1,0A,26,1D,B6
630 DATA 7D,03,81,01,26,0C,86,00
640 DATA B7,7D,03,86,39,B7,01,67
650 DATA 20,0A,86,01,B7,7D,03,86
660 DATA 7E,B7,01,67,39,20,01,12
670 DATA 34,06,B6,7D,28,81,C8,25
680 DATA 0B,7F,7D,28,4F,BD,A0,EA
690 DATA B1,20,26,F9,35,06,7C,7D
700 DATA 2B,39
710 POKE 360,&H7D:POKE 361,&H26
720 POKE 363,&H7D:POKE 364,&H01
730 POKE 359,126:POKE 362,126
740 CLS:PRINT:PRINT"
    PROGRAM INSTALLED"
750 PRINT:PRINT" PRESSING
    <DOWN-ARROW> TOGGLES"
760 PRINT" PROGRAM ON AND OFF"
770 NEW

```




7D01	30	PRT \$000C
7D01 2001	40	BRA @START
7D03 12	50	@TOGGLE NOP
7D04 810A	60	@START CMPA #10 DOWN ARROW
7D06 261D	70	BNE @OUT IF NOT THEN RETURN
7D08 B67D03	80	LDA @TOGGLE
7D08 B101	90	CMPA #1 IS ROUTINE ON
7D0D 260C	100	BNE @SETLIST IF NOT PUT ON
7D0F B600	110	LDA #0
7D11 B77D03	120	STA @TOGGLE SET OFF FLAG
7D14 B639	130	LDA #57
7D16 B70167	140	STA 359
7D19 200A	150	BRA @OUT
7D1B B601	160	@SETLIST LDA #1
7D1D B77D03	170	STA @TOGGLE SET ON FLAG
7D20 B67E	180	LDA #126 JUMP TO NEW ROUTINE
7D22 B70167	190	STA 359
7D25 39	200	@OUT RTS
7D26 2001	210	BRA @START1
7D28 12	220	@STORE NOP
7D29 3406	230	@START1 PSHS D
7D2B B67D28	240	LDA @STORE NO OF CHARS PRINTED
7D2E B1C8	250	CMPA #200
7D30 250B	260	BLO @OUT1
7D32 7F7D28	270	CLR @STORE
7D35 4F	280	CLRA
7D36 BDA0EA	290	@HOLD JSR 41194 GET* ROUTINE
7D39 B120	300	CMPA #32 SPACE PRESSED
7D3B 26F9	310	BNE @HOLD IF NOT WAIT
7D3D 3506	320	@OUT1 PULS D
7D3F 7C7D28	330	INC @STORE
7D42 39	340	RTS
7D43	350	END



REGISTERED DESIGN

INTRODUCTORY OFFER

For ZX81 Users, a
New Ram-Pack
Anti-Wobble Module
REGISTERED DESIGN

Designed by professionals, the IDM 90 offers a no nonsense approach to eliminate whiteout caused by Ram Pack wear and tear.

The IDM 90 is compact with a superb plastic coated finish in four attractive colours: black, red, yellow and white.

(Larger model No. IDM 91 for printer facility).

Price: £4.60 inc. VAT P&P 70p. Send cheque/PO to:

IDM Products,
Gorof Road, Ystradgynlais, Swansea. Tel: 0639 842404
(Money refunded if not delighted)

Spectrum 48k

MAKE YOUR OWN TV FILMS!

WITH LIVE ANIMATION

& MUSIC

SAVE them...

& AMUSE FRIENDS AND FAMILY
WHEN YOU PLAY THEM BACK!



"Make us walk
& talk!"



ORDER: £7

MACRO
CONSTRUCTION

& ANIMATION CASSETTE MCA

- SPECIAL MACRO-PROGRAMMING TECHNIQUES ALLOW YOU TO: -
- CALL-UP ANY MEMBER OF CAST, INCLUDING UFO, HELICOPTER AND A HOST OF 'PERSONNEL' IN A CHOICE OF NEARLY 30 'CALLS' MAKE EACH ANY COLOUR - LARGE ONES CAN BE IN TWO COLOURS!
- THEY WALK, RUN, CLIMB & FLY.
- BUILD HOUSES, CHURCHES ETC. IN A FLASH - & ERASE THEM
- UP TO 15 MINS. PER 'FILM', OR MORE IF YOU'RE A GOOD DIRECTOR
- MAKE CHARACTERS 'SPEAK' USING ANNOTATIONS AS IN STRIPS.
- FULL COMPUTER-PROMPTING TO SAVE YOU MAKING ERRORS.
- INSTANT PLAYBACK, EDITING AND DELETING AS YOU GO ALONG!
- MOST COMMANDS ARE A SINGLE KEY-STROKE, WITHOUT 'ENTER'
- COMPOSE YOUR OWN TUNES USING THE SPECIAL THREE-OCTAVE CHROMATIC MUSIC COMPOSER, WHICH ALLOWS YOU TO LISTEN, CORRECT AND EDIT AT EACH NOTE... IF YOU NEED TO!
- STORE UP TO NINE 99-NOTE TUNES TO 'CALL-UP' AT ANY TIME IN A STORY... COMPUTER GIVES EACH A NUMBER IN MEMORY.
- CHANGE TUNES AT ANY TIME, EVEN WHILST MAKING A 'FILM'.
- YOU CAN EVEN ADD PERSPECTIVE TO BUILDINGS, ROADS ETC.
- NO SPECIAL SKILLS OR COMPUTER KNOWLEDGE NEEDED... JUST IMAGINATION!



pinehurst data studios

IMPORTANT: FOR 48K SPECTRUM ONLY

69 PINEHURST PARK
WEST MOORS, WIMBORNE
DORSET. BH21 9BP

POPULAR Computing WEEKLY Back Issues

Almost all the copies of PCW that you missed can still be bought as back issues for only 50p, including postage and packing.

An index of the contents of the 36 issues published in 1982 is now available from the Publishers for only £1.20. It includes full details of all the programs, routines, reviews and news that you might have missed.

Please send me the following back issues at 50p each:

Total £

Please send me a copy of the 1982 PCW Index at £1.20

I enclose a cheque postal order for £

Name

Address

Please return to Back Issues, PCW, 12-13 Little Newport Street, London WC2R 3LD.

NOW OPEN!

SOFT TOUCH OF LONDON

YOUR NEW SOFTWARE DEALER
IN NW5, CELEBRATES ITS
OPENING WITH A SPECIAL
INTRODUCTORY OFFER:

10% DISCOUNT
ON ALL
SOFTWARE PURCHASED

COME AND SEE US NOW AT:
12 DARTMOUTH PARK HILL
LONDON NW5
(100 yards from Tuffnel Park Tube)

NB. EFFICIENT MAIL ORDER AVAILABLE
SAE BRINGS LATEST LIST

Audiogenic LTD

ATTENTION PROGRAMMERS

OBJECTIVE To increase the range of computers we service taking into account new machines on the horizon that are destined to make a large impact on the consumer market.

REQUIRED 4 programmers of high ability and proven track record on popular micros to work with us on new projects of your choice related to our existing product portfolio. Working in a place of your choice but in close contact with our present staff of 23 people.

REWARD For your abilities you would expect to earn in excess of £30,000 per annum in a financial environment designed to let you retain the maximum amount through prudent tax and legal advice.

CONTACT in writing and in strictest confidence giving full details of your career to date with examples of your work if possible. Mark your application Confidential and address it to Martin Maynard. I will arrange an informal meeting without obligation to discuss our plans.

AUDIOGENIC LTD
34-36 Crown Street
Reading, Berks

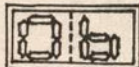
cable software **URGENTLY REQUIRE**

ORIGINAL, MACHINE CODE GAMES PROGRAMS
FOR THE

Commodore 64 - VIC 20
ZX Spectrum - Oric
Dragon - BBC - Electron

We have an international dealer & marketing network which will ensure maximum sales potential for your program.

Write in confidence to: Software Development Director
Cable Software Limited
Cape House
52 Limbury Road
Luton, Beds. LU3 2PL
or telephone: Luton 591493



In reverse

Trevor Toms continues his machine code series for the Spectrum — part three

Last week we looked at the storage on simple data items and glanced at how the same ideas could be extended into the machine code equivalent of arrays. The next stage of this development is to consider how expressions can be evaluated and assigned to variables.

The direct comparison with Basic is that we are trying to write the equivalent of:

```
LET x = b(4) * 6 + 2
```

in machine code.

The first step is to rewrite your expression in "reverse Polish" notation — just like calculators of a few years back (and today if you're lucky enough to afford a Hewlett Packard!).

So our expression above would be written as:

```
b(4) (stack)
6 (stack)
*
2 (stack)
+
```

giving a final result which will be stored in data area X using methods adopted last week.

Each operator (eg, * or + in this case) operates on the top two stacked items to give a resulting value on the top of the stack. If you've used Forth, you'll be very familiar with this concept — in fact, one reason why Forth is so fast is because the concepts translate very readily into machine code.

As a good guideline, try to keep to a strict convention regarding the use of registers in your routines. Personally, when writing a "Basic translation" program I use the HL registers to hold the "latest result" of any expression, the DE registers to hold array subscripts or second operand from an arithmetic operation, and the stack to hold the "latest result" when a nested expression is required.

Once again, it is worth stressing that this is not necessarily the best way to write machine code, but it is safe and helps assure working code until you have built up enough confidence to spread your horizons.

So we can now translate the small example above into machine code as follows:

```
b(4) LD DE,4
CALL GET$ITEM ;see last week
6 LD DE,6 ;direct value
* CALL MUL16 ;see 1st week
2 LD DE,2 ;direct value
+ ADD HL,DE ;res 11 in HL
LET x = LD (X),HL
```

Since the MUL16 and DIV16 routines leave their result in HL, you can see that the code required to evaluate this type of expression is extremely compact.

The equivalent of Basic functions be-

comes only a little more complex. By writing a series of small subroutines which operate on the value in registers HL and leave the result in HL, you can simulate most of the Spectrum functions quite easily. Listing 1 gives a handful of subroutines that simulate a fair proportion of the normal functions.

Remember that you cannot easily use floating point or strings in machine code without some degree of effort, so functions such as Sin, Log, STR\$, etc, are not included in this list. Nevertheless, you can write some extremely powerful programs without these functions. In future articles you'll see how some of these limitations can be overcome.

The routines are: Equal, Not\$Equal, Greater\$Than, Less\$Than, ZxAnd, ZxOr, ZxNot, ZxIn, ZxPeek. In each case (except the last two), the routine operates on two values supplied in the HL and DE register pairs, leaving a "true" or "false" result in

HL. As with Basic, "true" is represented by the value 1, while "false" is given by the value 0. It may have been more logical to use the value -1 (0FFFFh) for "true", but this would be inconsistent with Basic, and would therefore require some additional translation when rewriting your Basic program in machine code.

The last two are examples of the way that true binary functions can be implemented — the subroutines operate on the value in HL and leave the result in HL. In practice, you can write the "peek" routine more efficiently by using in-line code instead of calling a subroutine, but, as I have said earlier, keeping things consistent is best for now.

Below is a better example of how to use some of these routines alongside an equivalent Basic program (see also listing 2).

Next week we start to look at ways of using the Spectrum hardware from machine code — this is where things start hotting up!

By Trevor Toms, author of *The Spectrum Pocket Book*, published by Phipps Associates.

```
5 LET result = 0
LD HL,0 ;set RESULT to zero
LD (result),HL
10 LET char = CODE INKEYS: IF char = 0 THEN GO TO 10
L10: LD A,1 ;select keyboard
CALL SELDEV
CALL AWAIT$KEY ;wait for a key
LD L,A ;put keycode into HL
LD H,0
LD (char),HL ;... and save it
20 IF (char < 48) OR (char > 58) THEN GO TO 100
LD DE,48 ;check if > 48
CALL LESS$THAN
LD A,L ;test if true reply
OR A
JR NZ,L100 ;yes — jump forward
LD HL,(char) ;reload character value
LD DE,58 ;check if > 58
CALL GREATER$THAN
LD A,L ;test for true reply
OR A
JR NZ,L100 ;jump forward if true
30 LET result = (result * 10) + (char - 48)
LD HL,(result) ;load current result
LD DE,10
CALL MUL16 ;multiply by 10
PUSH HL ;save on stack
XOR A ;clear carry flag
LD HL,(char) ;load character value
LD DE,48
SBC HL,DE ;subtract 48
POP DE ;get (RESULT * 10) into DE
ADD HL,DE ;add to latest result
LD (result),HL ;resave
40 GO TO 10 JR L10 ;jump back for more
100 PRINT result
L100: LD A,2 ;select screen output
CALL SELDEV
LD BC,(result) ;load result value
CALL PRINT$NUM ;print it
110 STOP
RET ;return to Basic
```




Unlock Your Imagination

SCOPE

Computer Graphics Language

- ★ A VERY POWERFUL, TRUE MULTITASK LANGUAGE
- ★ AS FAST AS MACHINE CODE
- ★ SIMPLER THAN BASIC

Write Machine Code in a fraction of the time currently required

SCOPE is available from most good quality dealers and selected branches of

WHSMITH

For details of how to get your games published commercially contact ISP Marketing

TECHNICAL DETAILS

SCOPE is a fully structured multitask language specifically for writing *graphics, animation and sound*.

Being fully compatible with BASIC it is ideal for writing both arcade and adventure style games. Additionally, with SCOPE present in high memory it can be used as an assembler with SCOPE words as plain language mnemonics. Therefore no knowledge of machine code is required.

The language is extremely easy to comprehend and is very powerful indeed providing many features not available from BASIC.

SCOPE HAS TO BE USED TO BE BELIEVED

48K SPECTRUM



CLIP THE COUPON NOW AND UNLOCK YOUR IMAGINATION
Post to: ISP Marketing Ltd, Crown House, 280 High Street, Godalming, Surrey
Tel: Godalming (04868) 24 61. Please rush me _____ copies of the SCOPE computer
graphic language tape and instruction manual at £11.95 (GBP free).
(Cheques payable to ISP Marketing Ltd)

Block capitals please

Name

Address

Dealer Enquiries
Welcome

PRICE

£11.95

SPECTRUM

Addr	Hex	Op	Operands	Addr	Hex	Op	Operands
FF58		EQUAL:		FA00		SELDEV:	
FF58 A7		AND	A	FA00		EQU	1601H
FF59 ED52		SBC	HL,DE	FA00		PRINT#NUM:	
FF5B 210000		LD	HL,0	FA00		EQU	1A1BH
FF5E C0		RET	NZ	FA00		AWAIT#KEY:	
FF5F 23		INC	HL	FA00		EQU	15D4H
FF60 C9		RET		FA00		LESS#THAN:	
FF61		NOT#EQUAL:		FA00		EQU	0FF6BH
FF61 A7		AND	A	FA00		GREATER#THAN:	
FF62 ED52		SBC	HL,DE	FA00		EQU	0FF6AH
FF64 210100		LD	HL,1	FA00		MUL16:	
FF67 C0		RET	NZ	FA00		EQU	65000
FF68 2B		DEC	HL	FA00		ORG	64000
FF69 C9		RET		FA00		ENTRY#POINT:	
FF6A		GREATER#THAN:		FA00 210000		LD	HL,0
FF6A EB		EX	DE,HL	FA03*220000		LD	(RESULT),HL
FF6B		LESS#THAN:		FA06		L10:	
FF6B A7		AND	A	FA06 3E01		LD	A,1
FF6C ED52		SBC	HL,DE	FA08 CD0116		CALL	SELDEV
FF6E 7C		LD	A,H	FA0B CDD415		CALL	AWAIT#KEY
FF6F 17		RLA		FA0E 6F		LD	L,A
FF70 210000		LD	HL,0	FA0F 2600		LD	H,0
FF73*E20000		JP	PD,LTB	FA11*220000		LD	(CHAR),HL
FF76 3F		CCF		FA14 113000		LD	DE,48
FF77		LTB:		FA17 CD6BFF		CALL	LESS#THAN
FF77 ED6A		ADC	HL,HL	FA1A 7D		LD	A,L
FF79 C9		RET		FA1B B7		OR	A
FF7A		ZXPEEK:		FA1C*2000		JR	NZ,L100
FF7A 6E		LD	L,(HL)	FA1E*2A0000		LD	HL,(CHAR)
FF7B		PKB:		FA21 113A00		LD	DE,58
FF7B 2600		LD	H,0	FA24 CD6AFF		CALL	GREATER#THAN
FF7D C9		RET		FA27 7D		LD	A,L
FF7E		ZXIN:		FA28 B7		OR	A
FF7E 44		LD	B,H	FA29*2000		JR	NZ,L100
FF7F 4D		LD	C,L	FA2B*2A0000		LD	HL,(RESULT)
FF80 ED68		IN	L,(C)	FA2E 110A00		LD	DE,10
FF82 18F7		JR	PKB	FA31 CDE8FD		CALL	MUL16
FF84		ZXNOT:		FA34 E5		PUSH	HL
FF84 7C		LD	A,H	FA35 AF		XOR	A
FF85 B5		OR	L	FA36*2A0000		LD	HL,(CHAR)
FF86 210000		LD	HL,0	FA39 113000		LD	DE,48
FF89 C0		RET	NZ	FA3C ED52		SBC	HL,DE
FF8A 23		INC	HL	FA3E D1		POP	DE
FF8B C9		RET		FA3F 19		ADD	HL,DE
FF8C		ZXAND:		FA40*220000		LD	(RESULT),HL
FF8C 7C		LD	A,H	FA43 18C1		JR	L10
FF8D A2		AND	D	FA45		L100:	
FF8E 67		LD	H,A	FA45 3E02		LD	A,2
FF8F 7D		LD	A,L	FA47 CD0116		CALL	SELDEV
FF90 A3		AND	E	FA4A*ED4B0000		LD	BC,(RESULT)
FF91 6F		LD	L,A	FA4E CD1B1A		CALL	PRINT#NUM
FF92 C9		RET		FA51 C9		RET	
FF93		ZXOR:		FA52		CHAR:	
FF93 7C		LD	A,H	FA52 0000		DEFW	0
FF94 B2		OR	D	FA54		RESULT:	
FF95 67		LD	H,A	FA54 0000		DEFW	0
FF96 7D		LD	A,L				
FF97 B3		OR	E				
FF98 6F		LD	L,A				
FF99 C9		RET					
Symbols:				Symbols:			
EQUAL	FF58	NOT#EQ	FF61	SELDEV	1601	PRINT#	1A1B
GREATER	FF6A	LESS#T	FF6B	AWAIT#	15D4	LESS#T	FF6B
LTB	FF77	ZXPEEK	FF7A	GREATER	FF6A	MUL16	FDEB
PKB	FF7B	ZXIN	FF7E	ENTRY#	FA00	L10	FA06
ZXNOT	FF84	ZXAND	FF8C	L100	FA45	CHAR	FA52
ZXOR	FF93			RESULT	FA54		
No error(s)				No error(s)			

Programming by angles

Czes Kosniowski explains the use of trigonometry in programming

Seldom can we directly measure the heights of tall buildings, hills, trees, etc. One way to find the height of a building or tree is to stand away from the object. Now measure the angle between the horizontal and the highest point of the object (using a clinometer, which is just a glorified protractor), then measure the distance between you and the object. By drawing a scale drawing the height of the object can be readily estimated. See Figure 1.

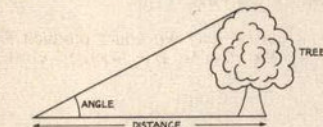


Figure 1

You couldn't use the same technique to measure the height of a mountain peak which is miles away and covered in clouds. The clouds would get in your way, and you couldn't measure the horizontal distance. An instrument such as a tellinometer would help. This uses radar to locate the top of the mountain. It also measures the angle and distance between you and the top. A scale drawing would provide a way of calculating the height of the mountain. (Figure 2).

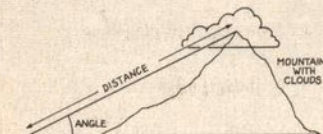


Figure 2

As a further example suppose we wanted to find the width of a large pond or lake (see Figure 3). A scale drawing drawn from the measurements made could be produced and the required distance estimated.

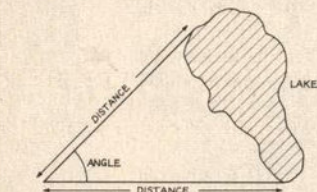


Figure 3

Here is a related example. A navigator is at a certain position A. He is 150 km due west of city B and 188 km from city C. The angle between the two cities is 23 degrees measured from his position. How far apart are the two cities? Again, a scale drawing could provide the answer.

Although scale drawing will provide answers to the problems mentioned above they are rough and ready. And it is not

always practicable or accurate to produce scale drawings. An alternative approach is to do it by trigonometry using your Commodore 64.

The trigonometry functions

The three important trigonometric functions are SIN (sine function), COS (cosine function) and TAN (tangent function). They each represent ratios of the various sides of a right-angled triangle. For example, the triangle in Figure 4 is a right-angled triangle. The angle at the corner of the left is denoted by the symbol X. The three sides of the triangle will be referred to as the side adjacent to X, the side opposite X, and the hypotenuse (the longest side).

$$\text{TAN}(X) = \frac{\text{opposite}}{\text{adjacent}}$$

$$\text{SIN}(X) = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\text{COS}(X) = \frac{\text{adjacent}}{\text{hypotenuse}}$$

Some useful values to remember are the following:

$$\begin{aligned}\text{SIN}(0^\circ) &= 0 \\ \text{SIN}(30^\circ) &= 0.5 \\ \text{SIN}(45^\circ) &= 1/\text{SQR}(2) \\ \text{SIN}(60^\circ) &= \text{SQR}(3)/2 \\ \text{SIN}(90^\circ) &= 1\end{aligned}$$

$$\begin{aligned}\text{COS}(0^\circ) &= 1 \\ \text{COS}(30^\circ) &= \text{SQR}(3)/2 \\ \text{COS}(45^\circ) &= 1/\text{SQR}(2) \\ \text{COS}(60^\circ) &= 1/2 \\ \text{COS}(90^\circ) &= 0\end{aligned}$$

$$\begin{aligned}\text{TAN}(0^\circ) &= 0 \\ \text{TAN}(30^\circ) &= 1/\text{SQR}(3) \\ \text{TAN}(45^\circ) &= 1 \\ \text{TAN}(60^\circ) &= \text{SQR}(3)\end{aligned}$$

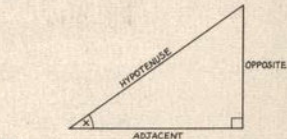


Figure 4

If you know the angle X and one of the three lengths of a right-angled triangle then you can find the other two lengths. For example, if you know the angle X and the length of the adjacent side then the other two lengths are given by the following formulae.

$$\begin{aligned}\text{opposite} &= \text{TAN}(X) \times \text{adjacent} \\ \text{hypotenuse} &= \text{adjacent}/\text{COS}(X)\end{aligned}$$

Another way of describing the trigonometric function is by using a circle of radius 1 unit. Measure out the angle required as shown in Figure 5. The values of the various trigonometric functions are indicated.

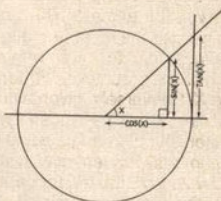


Figure 5

Mathematically distances are measured horizontally from left to right and vertically upwards. This explains why, for instance, in Figure 6 $\text{Cos}(X)$ has a negative value.

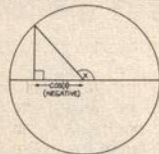


Figure 6

You can obtain SIN, COS and TAN of an angle X by typing `Print Sin(X)`, etc, substituting the appropriate value of X. The only possible problem is that the Commodore 64, like most microcomputers, expects the angles in radians, not degrees. Fortunately, degrees can be turned into radians and vice versa very easily.

First of all, what is a radian? Draw a circle of radius 1 unit. Measure along the circumference of your circle a distance which is equal to the radius of the circle. The angle subtended by this arc is 1 radian. 1 radian is approximately 57°. See Figure 7.

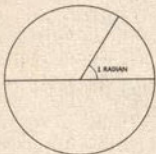


Figure 7

The number π is both remarkable and famous. It is defined to be the ratio of the circumference of a circle to its diameter. The (approximate) value of π is stored in your Commodore 64. Simply type `Print pi` to reveal the value stored. In a circle of radius 1 unit the diameter is 2 units. Thus the circumference of this circle is $2 \times \pi$ and so there are $2 \times \pi$ radians in a complete circle. Since there are 360 degrees in a complete circle we see that:

$$\begin{aligned}360^\circ &= 2 \times \pi \text{ radians, and} \\ 180^\circ &= \pi \text{ radians}\end{aligned}$$

We can convert degrees to radians and vice versa quite easily with the following formula:

$$X \text{ degrees} = X \times \pi / 180 \text{ radians}$$

$$Y \text{ radians} = Y \times 180 / \pi \text{ degrees}$$

The following program can be used to find lengths of right-angled triangles. You need to input an angle and one distance. Program 1 calculates the other two lengths.

Inverse functions

Suppose we know the lengths of the sides of a right-angled triangle, can we determine the various angles? The answer is yes, and we use the inverse trigonometric functions to do this. Given an angle X then $\tan(X)$ gives us a number, the tangent of the angle X . Conversely, given a number N we could find an angle whose tangent is that number. Such an angle could then be called the inverse tangent of N . It is usually denoted by $\text{Atn}(N)$, the arc tangent of N .

Look at the triangle in Figure 8.

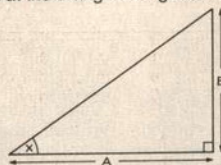


Figure 8

If we know the values of A and B then we could find the value of the angle X . We know that $\tan(X) = B/A$, thus $X = \text{Atn}(B/A)$. You can put in the appropriate values in this expression and get your Commodore 64 to print out the answer. Of course, the answer would be in radians. To get an answer in degrees you need to multiply the result by $180/\pi$.

The trigonometric functions SIN and COS also have inverse functions denoted by Asn (arc sine) and Acs (arc cosine)

respectively. $\text{Asn}(N)$ is that angle whose sine is N ; similarly $\text{Acs}(N)$ is that angle whose cosine is N . Unfortunately the Commodore 64, in common with many other microcomputers, does not contain these functions in its basic. However they can be easily obtained from the Atn function.

To see how we obtain Asn from Atn , look at the right-angled triangle with a hypotenuse of length 1 unit in Figure 9.

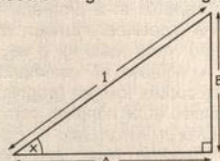


Figure 9

Now suppose that we know the value of B , and we want to find the angle X . We know that $\sin(X) = B$ so that $X = \text{Asn}(B)$, but as was mentioned Asn isn't present in the Commodore 64. If we knew the value of A then we could use Atn since $X = \text{Atn}(B/A)$ also. To find A we use Pythagoras' theorem.

Recall the theorem of Pythagoras. In words Pythagoras' theorem states that the square of the hypotenuse of a right-angled triangle is equal to the sum of the squares of the other two sides. In symbols we have $C^2 = A^2 + B^2$

where C is the length of the hypotenuse. Since our hypotenuse is of length 1 we have:

$$1 = A^2 + B^2$$

or

$$A^2 = 1 - B^2$$

and so

$$A = \text{SQR}(1 - B^2)$$

Since $X = \text{Atn}(B/A)$ we obtain

$$X = \text{ATN}(B/\text{SQR}(1 - B^2))$$

also, $\text{Asn}(B) = X$, and so we obtain

$$\text{Asn}(B) = \text{ATN}(B/\text{SQR}(1 - B^2))$$

In a similar way we could produce a formula for $\text{Acs}(A)$, one such is given below:

$$\text{Acs}(A) = \pi/2 - \text{ATN}(A/\text{SQR}(1 - A^2))$$

You should notice that $\text{Acs}(A) = \pi/2 - \text{Asn}(A)$.

Appendix H of the Commodore 64 User Manual contains other examples of mathematical functions which may be useful. ■

This is an extract from *Mathematics on the Commodore 64* by Czes Kosniowski, published by Sunshine Books.

```

10 REM PROGRAM FOR RIGHT-ANGLED
   TRIANGLES
20 PRINT CHR$(147) "      RIGHT-ANGLED
   TRIANGLES" CHR$(17)
30 PRINT "THIS PROGRAM ENABLES
   YOU TO FIND THE"
40 PRINT "SIDES OF A RIGHT ANGLED
   TRIANGLE"
50 PRINT "PROVIDED YOU KNOW ONE
   SIDE AND ANGLE." CHR$(17)
60 PRINT "          N%
          N %
          N %"
70 PRINT "          N %
          N %"
80 PRINT " HYPOTENUSE  %OPPOSITE
          N %"
90 PRINT "          NANGLE %
          ##### "
95 PRINT "          ADJACENT" CHR$(17)
)
100 REM INPUT DETAILS
110 INPUT "ANGLE. IN DEGREES. ":X
120 IF X<=0 OR X>=90 THEN PRINT
   "ERROR - NOT A TRIANGLE":GOTO 110
130 PRINT CHR$(17) "WHICH SIDE DO
   YOU KNOW? 1 (OPPOSITE)"
140 PRINT "2 (ADJACENT) OR 3
   (HYPOTENUSE). "
150 INPUT "TYPE 1, 2 OR 3 ":T
160 IF T<1 OR T>3 OR T<>INT(T)
   THEN 150

```

```

170 PRINT CHR$(17) "TYPE IN THE
   LENGTH OF THIS SIDE."
180 INPUT "LENGTH ":L
190 IF L<=0 THEN PRINT "FUNNY -
   TRY AGAIN":GOTO 180
200 REM CONVERT TO RADIANS
210 X=X/180
220 REM THE SPLIT OFF
230 ON T GOSUB 300,350,400
240 PRINT CHR$(17) "      THAT'S IT -
   ANOTHER GO Y OR N?"
250 GET G$:IF G$<>"Y" AND G$<>"N"
   THEN 250
260 IF G$="Y" THEN RUN
270 PRINT CHR$(147) "BYE FOR NOW."
   :END
300 REM OPPOSITE SIDE KNOWN
310 PRINT CHR$(17) "ADJACENT SIDE:"
   L/TAN(X)
320 PRINT "      HYPOTENUSE:" L/SIN(X)
330 RETURN
350 REM ADJACENT SIDE KNOWN
360 PRINT CHR$(17) "OPPOSITE SIDE:"
   TAN(X)*L
370 PRINT "      HYPOTENUSE:" L/COS(X)
380 RETURN
400 REM HYPOTENUSE KNOWN
410 PRINT CHR$(17) "OPPOSITE SIDE:"
   SIN(X)*L
420 PRINT "ADJACENT SIDE:" L*COS(X)
430 RETURN

```


An easy life for some

Keith and Steven Brain take a look at programming aids for the Dragon 32

Moving on from sound and graphics (PCW 24-30 November) here are some programming aids for the Dragon 32 which can make your life much easier.

Toolkit (Premier) is for those who prefer to stick to Basic rather than delve into machine code. It is available on disc or as an Eprom (within Delta or separate) and it adds over 50 new commands to Basic. Although programs incorporating the new commands will only run if **Toolkit** is present, the program also has some first-class editing commands which can be used to edit any program.

The full screen editor is a twin cursor type, which allows you to copy characters from the editing cursor to the normal cursor. You can use the full screen editor in co-operation with the Dragon's standard editing facilities (so that there are not a lot of new commands to remember), or you can recopy a whole line. To save the problem of text scrolling off the top of the screen, you can move text to one of two other text screens, and also swap text screens.

Extensive search and replace facilities are included and **Plan** gives you total control over output to a printer controlling factors such as paging, column length, margin, etc. Extra cassette handling commands are **Cdir** (gives a directory of a tape) and **Cappend** (appends from tape).

Inkey is like **Inkey\$**, but gives the Ascii value of a key pressed, while **Key\$** and **Key** are like **Inkey\$** and **Inkey**, but with built-in auto-repeat. **Inp n,A\$** gives you a controllable length for an **Input**, so that you can prevent an ignorant (or malicious) user entering an illegally long string. **Deek** and **Doke Peek** and **Poke** two bytes at a time with a 16-bit number. **Beep On/Off** controls

a keyboard beep and **Break On/Break Off** enables/disables the break key.

Echo x-y,z copies lines x to y from z downwards and **Prune** removes everything after a **Rem** statement. **Vars** prints the active variable in a program, **Pause** waits for a specified number of milliseconds and **Hang** waits for a key to be pressed. A number of commands are provided to control low-res graphics. The comprehensive error handling commands (**Erl**, **Err**, **Error n**, **Error Goto n**, **Error Off**, **Resume**, **Resume Next**, and **Resume Goto n**) can be used to prevent your program from stopping if there is an error.

The **Resume** commands are important, as they allow you to continue immediately with your program (unlike the error commands in **Dragondos**). **Old** attempts to rescue a crashed program. You are allowed to **Goto** and **Gosub** line numbers specified as variables and you can program the keys A-H with up to 23 characters including **Enter**. For example, if you use:

PROG A "PAGE" + CHR\$(13) + "BEEP" + CHR\$(13) + "HANG" + CHR\$(13) + "RUN" + CHR\$(13)

then when you press **Shift** and **A**, it will **Page** your program, **Beep**, **Hang** and then **Run**.

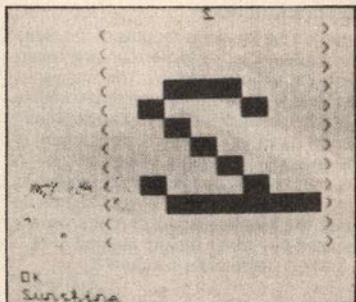
Even after all that description we have still left out some very useful features, so you can probably understand why we believe the Premier **Toolkit** is outstanding value at £29.95.

Encoder 09 (Premier) is a monitor, assembler, and disassembler for the Dragon which comes on cassette, disc (Delta), or Eprom (available as an option on the Delta Dos cartridge). The comprehensive manual is 52 pages long and includes details of the 6809 registers, instruction sets and different types of addressing, as well as the operation of the system.

The program starts up in the monitor mode, where a colon prompt before the cursor informs you that you are using the monitor. Typing **B** moves you to Basic and **&M** returns to the monitor. You can examine and change memory locations and search the memory for a Hex number or an Ascii string.

Block moves are allowed and you can execute machine code routines from the monitor, which will convert or calculate Hexadecimal, Octal, Binary and Decimal values, and also has extensive breakpoint routines. It is fully compatible with Dragon Basic and there is automatic line numbering and tabulation and a full complement of pseudo-opcodes.

You can incorporate assembly language within Basic programs by enclosing the code between square brackets. You can perform a test assemble to check the syntax before moving on to the real thing and assembly can be to memory, cassette,



printer, or disc. There are 19 error messages to help sort out any problems.

Encoder 09 costs £29.95 on tape, £34.95 on Eprom as a Delta addition, and £39.95 on cartridge. We found it easy to use and, if you want to get into machine code programming, then this is a sound investment.

Memory Module (Moray Microsystems) is a low power Cmos static Ram memory module running off Ni-Cads which are trickle charged when the computer is on. It can be used to provide instant memory back-up in case of a system crash or provide a temporary, reusable, "cartridge" facility. The unit is larger than a normal cartridge and, to prevent it flopping about in the expansion port, there are small plastic feet underneath the case. Before turning the Dragon off, you must remember to turn the memory protection switch on and, before you recover or store programs, you must put the memory protection off.

It is easy to store and retrieve a program using a small machine code routine. You could put this routine at the end of a Basic program and instead of **Csaving** the latest copy of your program every half an hour (in case the gremlins get loose in the mains supply), you could dump it into the memory module.

The module is available in a number of Ram configurations (4 to 14K) but, for example, will hold 4K for 83 days using ultra low power Cmos (£42) or 16.6 days using lower power Cmos (£39). This product is rather specialised, but would be of value in program development (especially if you don't have a disc system) or in education where you might want to change the cartridge contents at regular intervals.

The standard Dragon 32 interface is of the parallel Centronics type, although the new Dragon 64 also has a serial RS232 port. Many other machines have RS232 and the addition of this facility allows you to communicate more widely.

RS232C Interface (Cotswold Computers/CP Engineering) is a cartridge which comes with a detailed manual which explains the RS232 standard and how to transmit and receive data. Two demonstration programs are provided, the first being an interface test and the second a program to transmit the graphics screen from one Dragon to another (as we only



had a single interface we could not test the latter). The baud rate is easily controlled by an external, colour-coded, dip switch, and a brief description of the electronic specification is included.

It allows you to use any serial printer on the Dragon, communicate between your Dragon and any other machine with an RS232 interface, and eventually to communicate through a modem (which is currently under development) to the whole world, although of course you still need to write the software to control it! This is another rather specialised product which



will be of interest to the minority, although no doubt invaluable to them. The interface has already been used to connect the Dragon to a number of pieces of specialised scientific equipment.

In addition to serial and parallel ports, it is also useful to have straightforward input and output connections for control applications. *Dragon Interface* (Moray Microsystems) is an input/output module which allows the Dragon cartridge port to be used as a 4 or 8 input port (opto-isolated) with up to 8 relay output ports. Once the module has been configured, inputs are easily ready by *Peeking* location 49152 and relays operated/released by *Poking* appropriate values to 49153.

The module will accept dc inputs from +3 to +15 volts and the output channels will switch up to 220 volts at 0.5 amps. Data at the input channels is indicated by integral leds and connections to the unit are made via clearly marked terminal blocks, once you have managed to persuade four very small hex-head screws to come loose.

Possible applications of this unit are many and varied (we hope to report further on this in the near future), for example, you could easily control your model railway (or robot?). Another obvious application is to build a sophisticated intelligent burglar alarm system which can tell the difference between your cat sitting on the mat or rattling the window and a real threat.

The price depends on the specification, but it is based on a flat charge of £20 for 4 inputs or £28 for 8 inputs and then £3 per relay output (so that a full specification 8 input/8 output module costs £52). An add-on power module is also being made available (at around £40) which will switch 13 amp mains loads so that you can really let your computer control your central heating, greenhouse etc. This unit certainly

ly extends the power of your Dragon into interesting control applications.

Last, but not least, there are the lightpens which plug directly into the joystick ports of the Dragon and allow you to control the execution of your programs without touching a key. The Trojan Lightpen (Trojan Products) is a relatively simple device supplied with a program on cassette and a combination of instructions printed on the cassette insert and incorporated into the program. The main menu allows you to select options to run through the instructions, draw a simple histogram

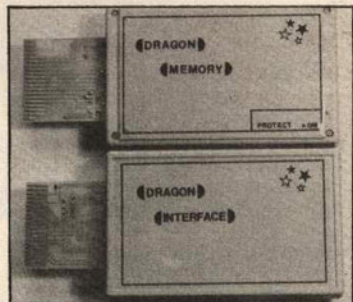
of light level, play a game of *Nim*, use the light pen to select which notes to sound, or draw directly on the screen. The drawing routine only uses *Pmode 1*, so the results are rather crude and you still have to use the keyboard as well, which rather defeats the object of using a lightpen!

Its value seems rather limited, but it is relatively cheap at £10.

The Datapen Lightpen (Datapen Microtechnology) is supplied with comprehensive instructions and a tape with three programs. It differs from all other light pens available for the Dragon in that it is a far more sophisticated (and rather more expensive at £25) beast. Important unusual features are a button mounted on the pen itself, which controls operation, and an led which indicates data capture.

The pen is also easier to use than most, because of its larger size and because the end is flattened and covered with non-slip rubber. It also seemed quite insensitive to changes in ambient light.

The first program provided is an introduction which allows you to work through instructions on how the pen works, produce a low-res flowchart, or find an X,Y screen position. The second program is *Sketch* in which you can draw directly on



the screen using any *Pmode*. Four options can be selected with the pen (*Draw*, *Erase*, *Blank* and *Paint*) and, by also using the keyboard, you can save to tape, draw a circle, and change the accuracy factor and measurement bars. This program uses a much faster screen strobe (which can easily be modified) and it clearly demonstrates the superiority of the Datapen.

The *Shape Create* program is very useful, as it allows you to produce designs directly on a screen matrix and then save these in a "library" in memory or on tape and use them later. The *Create more sprites* option allows you to design scaled-up sprites on the screen, while a normal sized version is drawn alongside, with total control by the lightpen. If you select the *Create Drawing* mode, then you can pick a sprite from the library you created and put it at any screen position at any of four 90-degree angles.

Although we have tended to be rather cynical about the value of lightpens in the past, the Datapen has transformed our views and is no doubt the best buy for anyone with a serious use.

Adding on all the facilities of all these products at the same time would certainly produce one hell of a machine, but with all those "bolt-on-goodies" we are sure that you would also need some "go-faster" stripes as well.

Firm	Program	Cost
Premier 208 Croydon Road Anerly London SE20 7YX	Toolkit Encoder 09	£29.95 £29.95*
Moray Microsystems 17 Kirkton Place Elgin IV30 3JR	Memory Module Dragon Interface	£42† £52†
Cotswold Computers 6 Middle Row Chipping Norton Oxfordshire	RS232C	
Trojan Products 166 Derlwyn Dunvant Swansea	Lightpen	£10
Datapen Microtechnology Kingsclere Road Overton Hants	Lightpen	£25

*Tape. †Varies according to option.

The REAL Challenge!

For your ORIC or SPECTRUM

Jogger Guide your joggers across a 4-lane motorway and crocodile infested river to reach their safe haven through the gap in the fence. Each time a jogger is safely home the next one will have to encounter more lories and cars on the motorway but fewer crocodiles and logs in the river. Full on-screen instructions. Micode, sound effects and full action colour graphics.
 Author - Adrian Sheppard
 Spectrum Author - Mike Howard
 Spectrum 48K - £6.95 Spectrum 16/48K - £4.95.
 Oric 48K - £6.95 Spectrum 16/48K - £4.95.



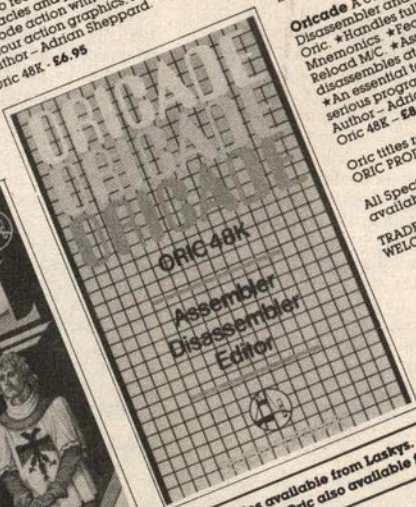
Dinky Kong Attempt to rescue your lovely girlfriend who is held captive by the angry gorilla. As you climb the connecting ladders and move along the gangways the gorilla will be throwing barrels and fireballs at you! The only way to reach her is to leap over these obstacles and progress to the top. Microcode action with sound effects, full colour action graphics, skill levels etc.
 Author - Adrian Sheppard
 Oric 48K - £6.95

Quincy A superb dice game for 2 to 6 players. 3 throws per go to try and score points by obtaining certain combinations, i.e. 3 of a kind, a run, pairs etc. 13 goes to complete a game. The highest score is the winner! It's a game that is easy to learn but can be won by skilful and thoughtful play. Full colour graphics, on-screen instructions, bonus scores, etc.
 Author - Tony Churcher.
 Spectrum 48K - £4.95.



SEVERN SOFTWARE
 5 SCHOOL CRESCENT
 LYDNEY
 GLOUCESTER GL15 5TA

Grail You have been chosen to seek and recover the Holy Grail from the Castle Perilous. Throughout the course of your task you will have to use your skill, intelligence and logic (along with a little luck) as you encounter many foes. You will have the opportunity to gather weapons and armour to fight with, but if you are wounded your strength will drain away - many other features such as warp, jewels etc.
 Author - Adrian Sheppard.
 Oric 48K - £6.95.



Oricade A combined assembler/disassembler and editor for the Oric. *Handles full 6502 Mnemonics *Features Save and Reload M/C *Assembles and disassembles at any address *An essential tool for any serious programmer.
 Author - Adrian Sheppard.
 Oric 48K - £8.50.
 Oric titles recommended by ORIC PRODUCTS INT. LTD.
 All Spectrum Software is available on Micronet 800.
 TRADE ENQUIRIES WELCOME.



Moria A challenging adventure game set in the mines of Moria. You'll have to try and survive encounters with the monsters of middle-earth while trying to locate Durin's Ring. The Wizard and Trader may help or hinder you on your journey to find and open the hidden doors to freedom - a game that will really test your character and staying power.
 Oric Author - Adrian Sheppard.
 Spectrum Author - Mike Howard
 Spectrum 48K - £6.95 Spectrum 16/48K - £4.95.
 Oric 48K - £6.95 Spectrum 16/48K - £4.95.

All Oric titles available from Laskys.
 Dinky Kong for Oric also available from WH Smith.

Please send me (Tick box)
SPECTRUM 16/48K

- ☐ Jogger @ £4.95
- ☐ Quincy @ £4.95
- ☐ Moria @ £4.95
- ☐ Dinky Kong @ £6.95
- ☐ Moria @ £6.95
- ☐ Oricade @ £8.50
- ☐ Grail @ £6.95

ORIC 48K

- ☐ Jogger @ £6.95
- ☐ Dinky Kong @ £6.95
- ☐ Moria @ £6.95
- ☐ Oricade @ £8.50
- ☐ Grail @ £6.95

I enclose Cheque/P.O. for £
 payable to Severn Software

Name _____
 Address _____

Severn Software, 5 School Crescent, Lydney, Gloucester GL15 5TA
 All prices include VAT and P&P.
 Overseas P&P add 50p.

A lifetime of games in one program!

CREATE & PLAY YOUR OWN ARCADE GAMES!

Simple to use

Software STUDIOS Games Designer

By John Hollis
Author of Time Gate, Aquaplane and Meteor Storm.

Invaders format Asteroids format
Defender format & Beserk format



8 GREAT GAMES INCLUDED:

Turbo Spider-Tanks
a lot-Halloween-
Attack of the
Mutant Hamburgers
Cyborg-Reflectron-
Splot and Q-Bix

Smooth Arcade quality throughout
using full colour sprites • Design
your own fully animated Aliens, Ships,
Missiles, Explosions • Full attack
wave design (8 waves per game)
• Moving background option • Full
sound generation • Full movement
control and scoring • Save and load
YOUR OWN games to and from tape!

£14.95

SPECTRUM 48K

Dealer enquiries welcome.

Marketed exclusively by Quicksilver

Games Designer	£14.95
Time Gate (48K Spectrum)	£6.95
Aquaplane (48K Spectrum)	£6.95
Meteor Storm (16K Spectrum)	£4.95

I enclose cheque/P.O. for
Please send me details of the
Quicksilver Game Lords Club ☐
My Game Lords Club membership
number is _____

Name _____

Address _____

Cheques payable to Quicksilver Ltd.

Send to Software Studio,
Quicksilver Mail Order,
P.O. Box 6,
Wimborne, Dorset BH21 7PY
Telephone: (0202) 891744

Boots, W.H. Smiths,
J. Menzies, Microdealer,
HMV, Hamleys, John Lewis
Computers for All
and all reputable
specialist computer
stockists.

**SPECIAL
OFFER**

Quicksilver Game Lords Club Members
£1.00 off Games Designer and £1.00 off Aquaplane
and other NEW Quicksilver Games – call for details. Quote
your secret membership No. on the order coupon.
Exclusive chance to
Quicksilver Game Lords Club members
to have their OWN games design published!
Details coming soon!



To the letter

Ian and Damian Inger present Word Search for the 32K BBC

This program is an educational type, for use with a group of pupils rather than one person alone. The teacher has to write a short passage (20 lines of 31 characters)

on the screen which then clears and the pupils are presented with a screen of coloured blocks, one for each letter. All punctuation marks and spaces are put on

to the screen for the pupils.

At random intervals, all occurrences of the guess letter are filled in on the screen. At 15 guess intervals, the pupils are invited to write out a two-line message, saying what they think the passage is about.

The program is designed to encourage group discussion about the positioning of letters and the frequency of certain letters within the passage.

```

:OREM Word search
20REM By Ian & Damian Inger
30REM (c) Nov 1983
40REM
50REM
60MODE7
70PROCinit
80PROCteacher_instruction
90PROCcenter
100PROCpupil_instruction
110PROCpunc
120PROCmove
130PROCguess
140PROCcheck
150R=RND(7):IF R=3 AND (A<136 OR
A>139) THEN PROCluck
160GOTO 120
170END
180DEFPROCinit
190T=0
200Q=0
210VDU23;8202;0;0;0;
220DIM A$(31,20)
230DIM B$(31,20)
240DIM T$(30)
250*K.9""
260*K.100LD:MRUN:M
270G$=CHR$(130)
280S$=CHR$(255)
290R$=CHR$(129)
300C$=CHR$(134)
310X1%=0:Y1%=0
320ENDPROC
330DEFPROCteacher_instruction
340CLS
350PRINT"Instructions to the teacher"
360PRINT
370PRINT"You should type the test
passage in CAPITAL LETTERS only."
380PRINT"If you make a mistake,
press the Delete key to erase it."
390PRINT"The program will accept
20 lines of 31 characters."
400PRINT"When you are typing the
test, the 'S$' will move to the next
line automatically. You may press
'Return' at any time to move to the
start of the next line."
410PRINT"When the last line is
complete, the "
420PRINT"Instructions for your pupils
will be displayed."
430REPEAT:PRINTTAB(0,23)"PRESS SPACE
BAR TO CONTINUE":UNTIL GET
440ENDPROC
450DEFPROCpupil_instruction
460CLS
470*FX15.1

```

```

480PRINT"INSTRUCTIONS"
490PRINT
500PRINT"This is similar to Hangman.
All you have to do is fill in the blue
squares with letters."
510PRINT"You will see a 'f' on the
screen. This is where you make your
guess."
520PRINT"The 'f' will always find the
next free space for you, but you may
move the 'f' around the screen with the
arrow keys if you wish."
530PRINT"If your guess is right,
the f will move to the next space."
540PRINT"If your guess is wrong, the
f will stay where it is."
550PRINT"If you are lucky, the
computer will find your guess letter on
every line and fill it in for you."
560REPEAT:PRINTTAB(0,23)"PRESS SPACE
BAR TO CONTINUE":UNTIL GET
570CLS
580PRINT"Sometimes, you will be asked
to write a short message saying what
you think the story is about. At the
end, press red key 9 and all of your
messages will be shown."
590PRINT
600PRINT"The total time taken for
you to complete the puzzle is also
shown."
610PRINT
620PRINT"You may press 'Return'
at any time to see the instructions."
630REPEAT:PRINTTAB(0,23)"PRESS
SPACE BAR TO CONTINUE":UNTIL GET
640TIME=0
650ENDPROC
660DEFPROCcenter
670CLS
680FOR Y=0 TO 20
690PRINTTAB(0,Y):G$:
700PRINTTAB(35,Y):Y+1;
710NEXT
720PRINTTAB(0,21):R$:PRINTTAB
(0,22):R$
730PRINTTAB(1,21)"USE CAPITAL
LETTERS ONLY"
740PRINTTAB(1,22)"PRESS 'DELETE'
IF YOU MAKE A MISTAKE"
750X=0:Y=0
760REPEAT
770PRINTTAB(X+2,Y):S$
780A$(X,Y)=GET$
790AS=ASC(A$(X,Y))
800IF AS=13 AND X<31 THEN REPEAT:
PRINTTAB(X+2,Y):" ":A$(X,Y)=" ":X=X+1:

```

Continued on page 49

® and TM designated
trademarks of
Sega Enterprises Inc.
© 1983 Sega Enterprises Inc.

The Official

FROGGER™

by **SEGA®**

The popular arcade game for the DRAGON 32.



SAFELY MANOEUVRE THE FROG TO
ITS HOME WITHIN THE TIME GIVEN.
CROSS THE HIGHWAY WITHOUT
GETTING RUN OVER AND CROSS
THE RIVER WITHOUT FALLING IN.
AVOID TRAFFIC, SNAKES, CROCODILES
AND DIVING TURTLES.

FOR 1 TO 2 PLAYERS. JOYSTICKS OPTIONAL

On Cassette £8 each (including VAT & Postage)

AVAILABLE FROM DRAGON 32 DEALERS NATIONWIDE
OR ORDER DIRECT FROM

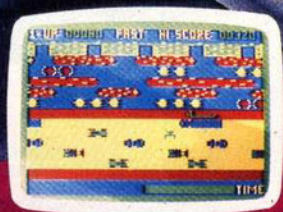
MICRODEAL

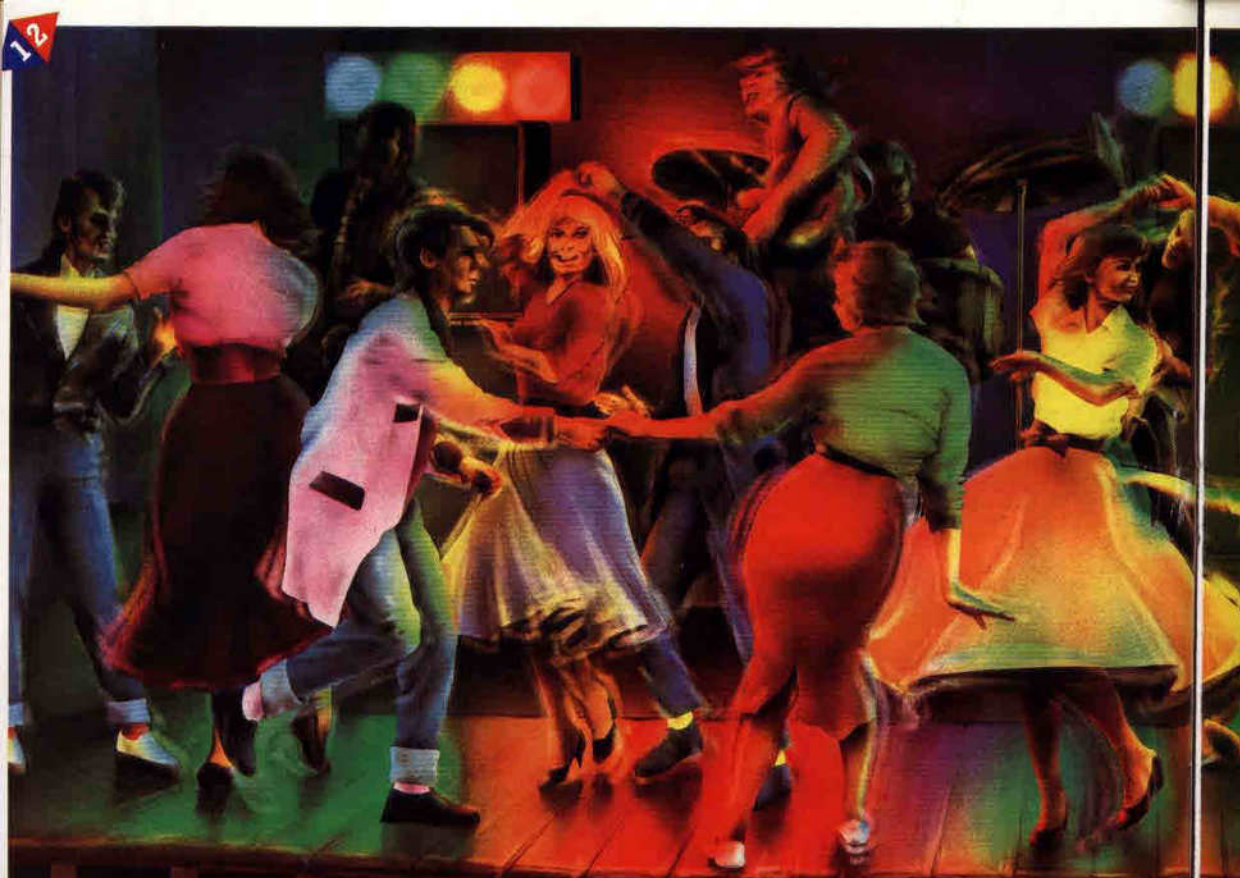
Dept. 41 TRURO ROAD, ST. AUSTELL CORNWALL PL25 5JE. TEL: 0726 3456

DISTRIBUTED
ON BEHALF OF
THE CORNSOFT
GROUP



AVAILABLE
FROM SELECTED
and John Menzies STORES







Once you've got to grips with the Rock 'n' Roll game, flip-over and get your teeth into Dracula.

New K-tel Doublesiders are great fun and great value which ever way round you look at them.

For only £6.95 you don't just get one top quality computer game, you get two.

When you've finished playing one side simply flip it over (just like a music cassette) and move off on a second totally different, equally gripping game.

Take your choice. Already there are five Doublesiders to choose



1 It's Only Rock 'n' Roll Can you become a superstar? A Rock 'n' Roll idol...Or are you just another has been? You've got a lot of energy, a bit of money and a great future. But can you stay the course, stand the heartbreaking disappointments, fraud, scandal, even arrest? Can you capture the hearts and wallets of the public and become a Rock 'n' Roll idol?

2 Tomb Of Dracula Darkness is falling...The vampires are hungry...You can't go back...Your only chance of survival lies ahead. The walls are cold and clammy. With each step you remember the horrors ahead; ghouls, zombies and pits of choking slime. In your hand you have but seven silver stakes with which to defend yourself...Dare you face the ultimate evil...and win.

from — three suitable for the ZX Spectrum and two for the Commodore Vic 20 — and there are more to come.

So hurry to the shops now and see for yourself how K-tel Doublesiders really do give you twice the fun with two on one.

K-TEL DOUBLESIDERS

Only £6.95 EACH



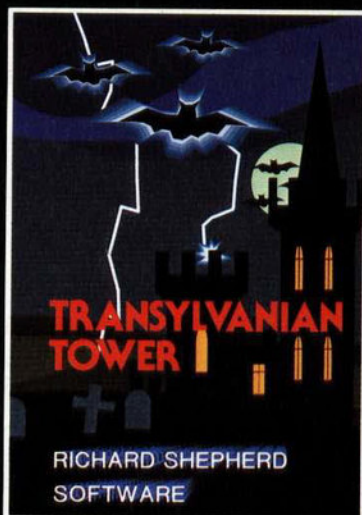
Twice the fun with two on one.

"ADVENTURES INTO"

AVAILABLE FROM W.H. SMITH
AND ALL LEADING CO.

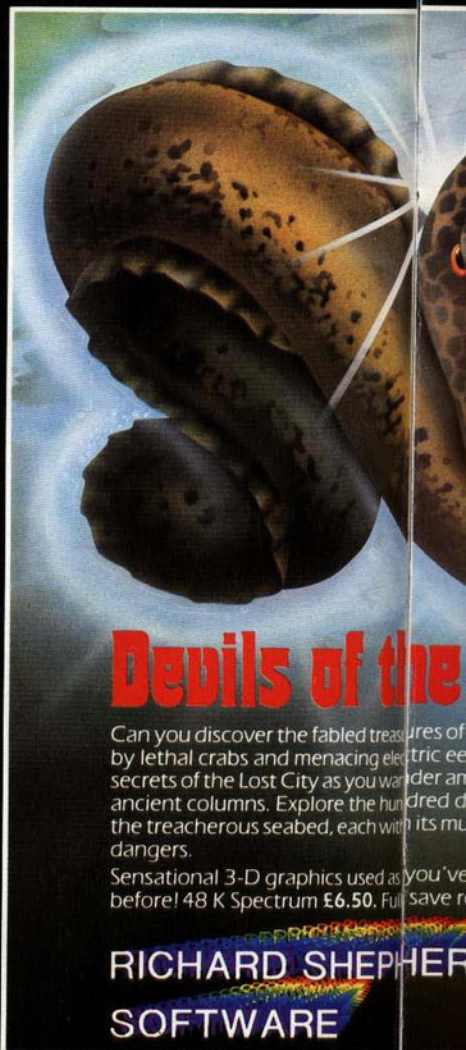
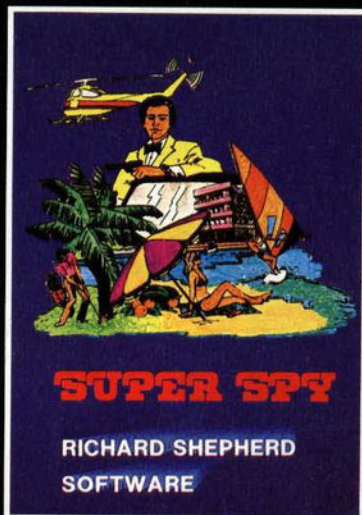
Transylvanian Tower

A spine chilling adventure...
enter via the dungeons...
navigate your way through
500 3-D rooms... survive
the swooping vampire bats
... reach the terrifying top...
confront and kill Count
Kreepie, ridding the world
of this Transylvanian Terror.
Can you survive the Top of
the Tower? Full save routine
for use during the hours of
darkness! 48K Spectrum
£6.50



Super Spy

Locate the secret island
hideaway of the mysterious
meglomaniac Dr. Death.
Follow his trail across
continents, through
complex puzzles and 3-D
mazes. Discover the
entrance to his under-
ground lair — but beware
— even with your death-
defying gadgets his evil
henchmen may still win the
day!
With save routine for part
time secret agents! 48K
Spectrum £6.50



DEALERS — GENEROUS DISCOUNTS AVAILABLE CONTACT

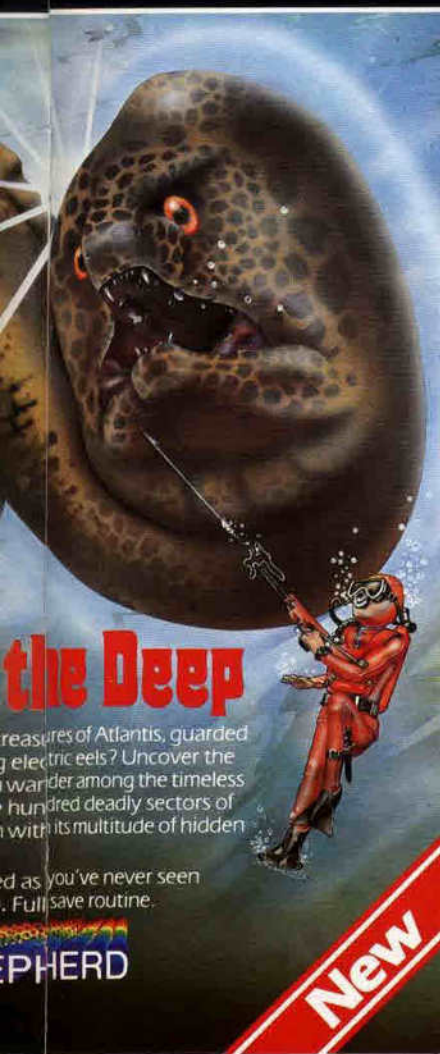
RICHARD SHEPHERD SOFTWARE

ELM HOUSE, 23-25 ELMSHOT LANE, CIPPENHAM, SLOUGH, BERKSHIRE.

CREDIT CARD HO
RING [062 86] 63
FOR EXPRESS SER

INTO IMAGINATION"

WITH, JOHN MENZIES, BOOTS*
NG COMPUTER STORES



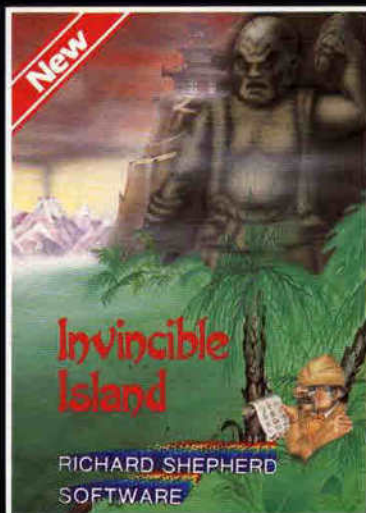
the Deep

treasures of Atlantis, guarded
g electric eels? Uncover the
wander among the timeless
hundred deadly sectors of
with its multitude of hidden

ed as you've never seen
Full save routine.

PHERD

New



New

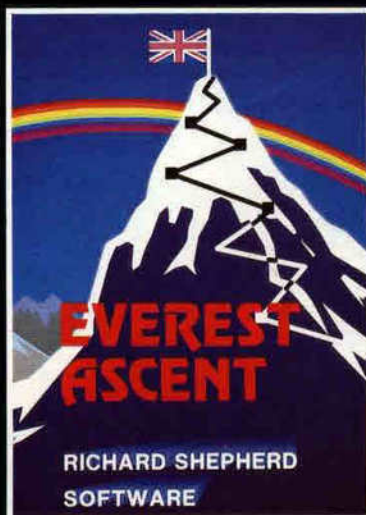
Invincible Island

RICHARD SHEPHERD
SOFTWARE

Invincible Island by Peter Cooke

Exhaust your ingenuity in the quest to find The Seven Parchments of Xaro and their meaning! Will they lead you to undreamt of treasures or eternal doom? Explore the mysteries of the stockade and puzzle within the Pagoda! A spectacular split screen graphic and text adventure to braintease you for weeks!

Adventurous graphics for every location. Save routine. 48K Spectrum £6.50.



EVEREST ASCENT

RICHARD SHEPHERD
SOFTWARE

Everest Ascent

Stake your claim to the top of the world in this strategic vertical adventure. Conquer the summit of the world's highest peak! ... struggle from base camp to base camp ... survive the elements ... watch out for avalanches, thin ice and wayward sherpas ... encounter abominable snowmen and cross bottomless crevasses!

A game of skill, strategy and planning — a graphic simulation of man's ultimate endeavour! Save routine. 48K Spectrum £6.50.

CONTACT JOHN SALTHOUSE ON (06286) 63531 FOR DETAILS

CARD HOTLINE
(06286) 63531
PRESS SERVICE

RICHARD SHEPHERD SOFTWARE

ELM HOUSE, 23-25 ELMSHOT LANE, CIPPENHAM, SLOUGH, BERKSHIRE.

ent, hired out, resold or otherwise circulated without the written permission of Richard Shepherd Software Ltd.

Selected titles available at larger branches

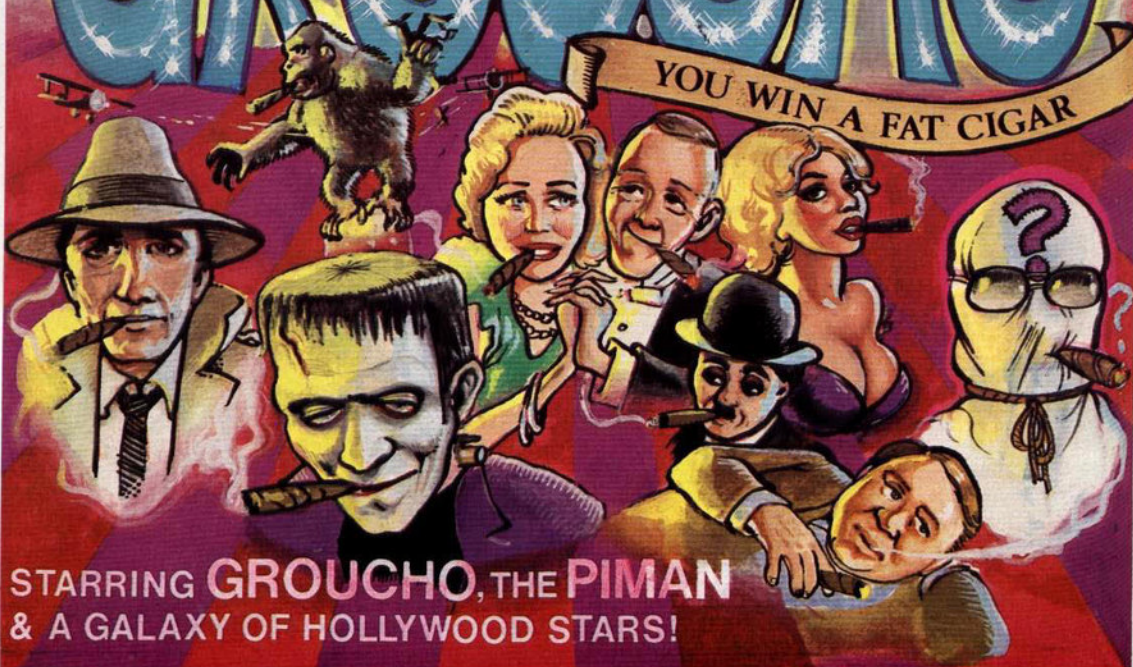
AUTOMATA U.K. LTD, THE CREATORS OF
PIMANIA

PRESENT THE COMPUTER
ENTERTAINMENT WHERE
DREAMS COME TRUE!

MY NAME IS UNCLE

GROUCHO

YOU WIN A FAT CIGAR



STARRING **GROUCHO**, THE **PIMAN**
& A GALAXY OF HOLLYWOOD STARS!

AUTOMATA UK LTD.

LEVEL
4

Present



MORRIS

MEETS THE

BIKERS

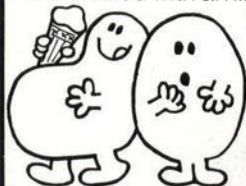
More than fun and games!

FIRST STEPS with the Mr. Men

by Primer Educational Software

The ever-popular Mr. Men help prepare young children for reading with four simple and absorbing games designed to exercise essential skills as well as entertain.

An easy-to-use, colour-coded key guide is included with an illustrated introductory book, featuring the Mr.



Men. For ages 4 to 8 years. Available now on cassette for the BBC B (Spectrum 48K and Electron versions coming shortly.) **£8.95**

QUICK THINKING!

by Widgeit Software

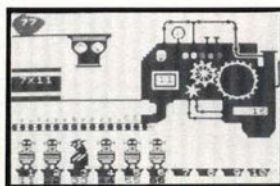
Two mind-stretching, space-age games to test mental arithmetic and nimble fingers.

In **Sum Vaders** alien robots invade the earth. Only quick thinking and fast reactions can prevent them. Several levels of difficulty and a two-player game with a handicap option make Sum Vaders equally testing for all family members, from 8 years to adult.

Robot Tables challenges the young player to make a series of perfect robots.

Knowing your multiplication tables is the key to controlling the robot-making machine. With a learning mode and a testing mode, Robot Tables is a fun way

for early learners, and more advanced children, to master an important and often neglected skill.



Available now on cassette for the Spectrum 48K and Commodore 64 (BBC B and Electron versions coming shortly.) **£6.95**

CAESAR THE CAT

by Andromeda Software

Meat Caesar, a cheeky young cat on duty in a well-stocked larder. He's kept busy chasing a gang of hungry mice eating the family's food. Playing against the clock, you guide Caesar along crowded shelves to pounce on the mice.

A fast, colourful, all-action, arcade-style game with catchy music and a best-score record. Challenging for high-scoring arcade addicts as well as great fun to play for the novice.

Available on cassette for the Commodore 64

£8.95



Prices include VAT and post and packaging. MIRRORSOFT programs are available from selected branches of W.H. Smith and Boots, and other leading software stockists.

Trade enquiries welcome: phone 01-822 3580.

MIRRORSOFT

SOFTWARE FOR ALL THE FAMILY

To MIRRORSOFT, PO Box 50, Bromley, Kent, BR2 9TT

Please send me the following (enter number required of each item in the space provided):

	Price	Spectrum 48K (01)	BBC B (03)	Commodore 64 (05)
First Steps with the Mr. Men (MM01)	£8.95			
Quick Thinking! (QT01)	£6.95			
Caesar the Cat (CC01)	£8.95			

I enclose a cheque/PO for £..... made payable to "Readers' Account: Mirror Group Newspapers Ltd".

Or please debit my ACCESS/BARCLAYCARD for the sum of £..... PC 4 card no.

I understand that my remittance will be held on my behalf in the bank account named above until the goods are despatched.

Signature.....

Name.....

Address.....

Postcode.....

Offer applies to Great Britain and Eire only. Please allow up to 28 days for delivery in the UK. MIRRORSOFT is a registered trade mark of Mirror Group Newspapers Ltd., Co. Reg No. 168660 Reg. Office: Highbury Circus, London EC1.

DEATHCHASE

3D as you have never seen before on your Spectrum! £6.95 will put you right on the saddle of the Big Bike! Ride deep into the forest through day and night, chasing the enemy riders. Weave through the trees at breakneck speed and watch out for helicopters and tanks – the greatest prizes of all!

Suitable for all Spectrums

new software
for a new
dimension

Retail Outlets: –

John Menzies, Selfridges, HMV Shops, WH Smiths, and Spectrum shops everywhere and all other good software stockists

Trade Enquiries:

PRISM 01-253 2277
Websters Software 0446 84152
Lightning Records and Video
10-949 5255
Micro Dealer UK
St Albans 34351

Kempston
Joyce
Compatible

MICROMEGA

Micromega, Personal Computer Division, Quantec Systems & Software Ltd, 230–236 Lavender Hill, London SW11 1LE.

Special Christmas offer
order two complete sets and
pay only £59.90

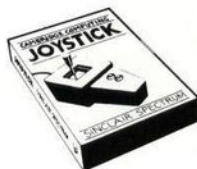
More

fun & games from your
Spectrum
with the intelligent
interface+program+joystick
and for only

£34.90

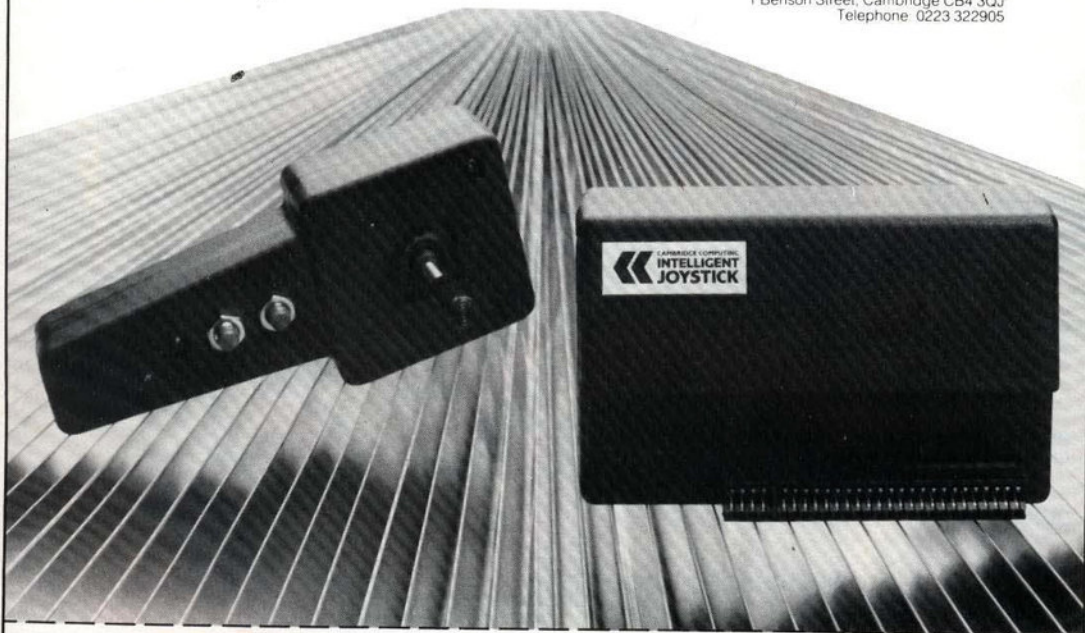
Interface: * for Spectrum
* 1k on board memory * own
rear edge connector – for
printers etc * compatible with
ALL standard joysticks

Joystick: * self centring
* 8 directional microswitched
action * 2 independent fire
buttons **Tape:** * easy to use
program, the interface
WORKS ON ALL SOFTWARE
* keeps a record of all your
games – so you only need to
tell it about each game once!



**CAMBRIDGE
COMPUTING**

Cambridge Computing
1 Benson Street, Cambridge CB4 3QJ
Telephone: 0223 322905



To Cambridge Computing
1 Benson Street, Cambridge CB4 3QJ
Telephone: 0223 322905

Name _____

Address _____

Please send me:

Joystick, Interface and Tape at £34.90 ☐ – Interface and Tape at £27.90 ☐

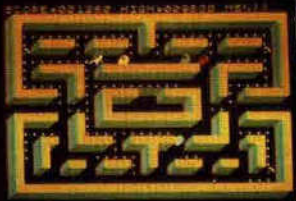
– Joystick only at £7.90 ☐ – For Spectrum

I enclose cheque/postal order * for £ _____ made payable to
Cambridge Computing

* delete as necessary



LUNA CRABS
By M.J. ESTCOURT



HAUNTED HEDGES
By DEREK BREWSTER



DEATH CHASE
By M.J. ESTCOURT

Kempton Joystick Compatible



For any Spectrum

ALL TITLES £6.95 INC VAT.
SELECTED MICROMEGA PRODUCTS
THROUGH: BOOTS, GREENS, ASDA,
JOHN MENZIES, LASKYS, WIGFALLS,
RUMBELOWS, HMV, SELFRIDGES,
WH SMITHS, SPECTRUM SHOPS
EVERYWHERE AND ALL OTHER GOOD
SOFTWARE STOCKISTS

Trade Enquires

PRISM 01 253 2277
WEBSTERS SOFTWARE 0486 84152
LIGHTNING RECORDS AND VIDEO 01 969 5255
MICRO DEALER UK - ST ALBANS 34351



STARCLASH
By DEREK BREWSTER

Kempton Joystick Compatible

NEW SOFTWARE FOR A NEW DIMENSION

Micromega - Personal Computer Division - Quantec Systems and
Software Ltd 230 Lavender Hill London SW11 1LE

*FROM BEYOND THE DARKEST
INFINITY OF HYPER-SPACE
COMES ONE NAME WE
CHALLENGE YOU TO BEAT...*

RODNIK



WAD!
WAP!

Games we challenge you to beat...on the 64, Vic 20, Spectrum, ZX81, BBC, Electron, Dragon, Oric, Lynx and Atari. See your local dealer for details.

BBC & EDUCATION

```

UNTIL X=32:X=31
810IF AS=127 THEN PRINTTAB(X+2,Y);
" ":A$(X,Y)="":X=X-1:IF X<0 THEN
X=31:Y=Y-1
820PRINTTAB(X+2,Y):A$(X,Y)
830IF AS<>127 THEN X=X+1
840IF X=32 THEN PRINTTAB(X+2,Y)"
":X=0:Y=Y+1
850UNTILY=21
860*FX15.1
870ENDPROC
880DEFPROCpunc
890CLS
900FOR Y=0 TO 20
910PRINTTAB(0,Y):C$;
920NEXT
930FOR Y=0 TO 20
940FOR X=0 TO 31
950IF ASC(A$(X,Y))<65 THEN
B$(X,Y)=A$(X,Y)
960IF ASC(A$(X,Y))>=65 THEN B$(X,Y)=S$
970PRINTTAB(X+2,Y):B$(X,Y)
980NEXT
990NEXT
1000ENDPROC
1010DEFPROCmove
1020*FX15.1
1030*FX4.1
1040PRINTTAB(X1%+2,Y1%):"f"
1050A=GET
1060IF A=13 THEN PROCInstructions
1070IF A=33 THEN PROClist
1080PRINTTAB(X1%+2,Y1%):B$(X1%,Y1%)
1090IF A=49 THEN PROClist
1100IF A=136 THEN X1%=X1%-1
1110IF A=137 THEN X1%=X1%+1
1120IF A=138 THEN Y1%=Y1%+1
1130IF A=139 THEN Y1%=Y1%-1
1140IF X1%<0 THEN X1%=31:Y1%=Y1%-1
1150IF X1%>31 THEN X1%=0:Y1%=Y1%+1
1160IF Y1%<0 THEN Y1%=20
1170IF Y1%>20 THEN Y1%=0
1180PRINTTAB(X1%+2,Y1%):B$(X1%,Y1%)
1190ENDPROC
1200DEFPROCguess
1210T=T+1:IF T/15=INT(T/15)
THEN PROCtele
1220G$=CHR$(A)
1230IF A>135 AND A<140 THEN ENDPROC
1240PRINTTAB(X1%+2,Y1%):G$
1250ENDPROC
1260ENDPROC
1270DEFPROCcheck
1280IF A>135 AND A<140 THEN ENDPROC
1290IF A=13 THEN ENDPROC
1300IF G$<>A$(X1%,Y1%) THEN
PRINTTAB(0,23)"WRONG":FOR H=20 TO 0
STEP -1:SOUND 1
.-10,H,1:NEXT:ENDPROC
1310B$(X1%,Y1%)=G$
1320X1%=X1%+1:IF X1%>31 THEN X1%=0:
Y1%=Y1%+1:IF Y1%>20 THEN Y1%=0
1330IF B$(X1%,Y1%)<>S$ THEN 1320
1340ENDPROC
1350DEFPROCluck
1360FOR X%=0 TO 31
1370FOR Y%=0 TO 20
1380IF A$(X%,Y%)=G$ THEN PRINTTAB

```

```

(X%+2,Y%):G$:B$(X%,Y%)=A$(X%,Y%)
1390NEXT
1400NEXT
1410ENDPROC
1420DEFPROCtele
1430CLS
1440PRINT"What do you think this
is about?"
1450PRINT"Type your ideas below, but
don't use more than two lines."
1460PRINT"Press Return when you
have finished"
1470PRINT:PRINT:PRINT
1480INPUTT$(Q):Q=Q+1
1490CLS
1500FOR Y=0 TO 20
1510PRINTTAB(0,Y):C$;
1520NEXT
1530FOR X%=0 TO 31
1540FOR Y%=0 TO 20
1550PRINTTAB(X%+2,Y%):B$(X%,Y%)
1560NEXT
1570NEXT
1580ENDPROC
1590DEFPROCInstructions
1600CLS
1610PRINTCHR$141+"INSTRUCTIONS"
1620PRINTCHR$141+"INSTRUCTIONS"
1630PRINT:PRINT:PRINT
1640PRINT"The 'f' will move to the
next space on its own"
1650PRINT"If you do not want to make
a guess thereuse the arrow keys to
move the 'f' around the screen"
1660PRINT"When the 'f' is in position,
type in your guess"
1670PRINT"When you have finished the
whole story, press";CHR$(129);"red
key 9"
1680PRINT"This will list your
messages"
1690PRINT:PRINT
1700PRINT"If there is anything
else which you do not understand,
ask your teacher"
1710REPEAT
1720PRINTTAB(0,23)"PRESS SPACE BAR
TO CONTINUE"
1730UNTIL GET
1740CLS
1750*FX15.1
1760FOR X=0 TO 31
1770FOR Y=0 TO 20
1780PRINTTAB(0,Y):C$;
1790PRINTTAB(X+2,Y):B$(X,Y)
1800NEXT
1810NEXT
1820ENDPROC
1830DEFPROClist
1840CLS
1850PRINT
1860PRINT"Your guesses were:-"
1870FOR L=0 TO Q
1880PRINTT$(L)
1890NEXT
1900PRINT"Time taken ":(TIME DIV
6000)MOD 60:" minutes"
1910END

```


DYNAMIC GAMES FOR YOUR TI 99/4A

A GREAT BOOK OF 29 GAMES TO HELP YOU MAKE THE MOST OF YOUR TI 99/4A

Now you can turn your TI 99/4A into a great games machine, and make it perform just as you hoped it would when you first bought it.

The games in this 160-page book include: MISSION VENUS; SUBMARINE COMMANDER; CHECKERS; ALIEN ENCOUNTER; ASTORRIA; AIR RAID; REVERSI/OTHELLO; SPACE SURVIVAL; LIFE; SPACE RACE and STAR PATROL. DYNAMIC GAMES FOR YOUR TI 99/4A was written by 17-year-old Scott Vincent, one of the UK's most outstanding young games programmers.

The book is available from book and computer stores... or order direct from us.



Interface Publications, Dept. PC,
44-46 Earls Court Road, London W8 6EJ.

INTERFACE PUBLICATIONS

Please send me a copy of
DYNAMIC GAMES FOR YOUR TI 99/4A. I enclose £4.95.

Name _____

Address _____

Computer and book trade supplied by The Computer Bookshop
30 Lincoln Road, Otter, Birmingham B27 6PA (021 707 7544; telex 334361)

NOW 2ND GREAT YEAR!

HIRE

ZXSII/SPECTRUM PROGRAM TAPES

FREE ILLUSTRATED QUARTERLY MAGAZINE WITH TIPS, NEWS, REVIEWS, DISCOUNT OFFERS PLUS OUR TOP 40 TAPES CHART BASED ON THOUSANDS OF SCORES!

JOIN OVER 2,000 DELIGHTED MEMBERS!

UP TO 2 WEEKS FROM ONLY 64P + P/P & VAT!

CHOOSE FROM TAPES BY 40 TOP SUPPLIERS ALL WITH PERMISSION!

YOUR FIRST TAPE FREE BY RETURN
IF YOU JOIN WITHOUT DELAY USING THIS SPECIAL COUPON!

THE ORIGINAL SINCLAIR LIBRARY

TO: SINCLAIR OWNERS' SOFTWARE LIBRARY - Warren Road, Liss, Hants GU33 7DD

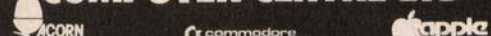
NAME _____ ADDRESS _____

Enclose £3.50 for year's membership (Spectrum) or £7.50 (ZXII); overseas (Europe only) add £2 unless with a local branch as below:

MAINTENANCE (for free tapes)

Benelux: Jacobusmans, 15, B-2030 Melle, Belgium (members fee £4.50 + Guilder 1.75 + 6% BTI);
Spain: 9, P.O. Box 1199, Madrid, Spain; P.O. Box 1199, Madrid, Spain; P.O. Box 1199, Madrid, Spain.

TWICKENHAM COMPUTER CENTRE LTD



Buy the **BEST** **BRITISH** **COMPUTER**

BBC Model A £299
BBC Model B £399

As supplied to schools, local authorities and government departments by the leading BBC Acorn dealer & service centre

Wordwise Word Processor
Software - Acorn, Bugbyte, Computer Concepts
Acornsoft on Disk • Digitiser Graphics Plotter
Joysticks for the BBC • 100K Single Disk Drives
BBC 800K Twin Disk Drives
Torch 800K Twin Disk Drives with CPN

ALL PRICES INCLUDE VAT
(at standard rate)

Ceedata 8200 Word Processor FROM £1,995
64K Internal Memory (up to 256K optional) • Twin floppy disk drives • 60 soft programmable keys (all set for Wordstat) • cables • user manual • C/P/M manual • C/P/M software with utilities • keyboard overlays available.

*Commodore 64: £229 *Apple IIE 64K on special offer - phone for latest price
Now in stock: Acorn Electron £199

ACORN/BBT Software for the BBC
Peeko-Computer Pack
Algebraic Manipulation Pack
Creative Graphics Cassette
Graphs & Charts Cassette
Desk Diary
Philosopher's Quest
Sphinx Adventure
Monsters
Snapper
Planetoid

Daisywheel Printer for BBC (complete with interface) £385
Star 510 Dot Matrix Printer
Star 510 Dot Matrix Printer
Brother Daisywheel Printer
Juki Daisywheel Printer
Black & White TV with Monitor conversion
12" or 14" £350
Cassette Deck (BBC compatible): £30

Acorn/BBC Main Distributors - Trade Enquiries Welcome
Twickenham Computer Centre
72 Heath Rd Twickenham, Middx TW1 4BW (Tel: 01-891 4991)

Delivery extra - nationwide by Securair

See us at the
Wembley Xmas Fair 15-18 Dec
Stand V36

WIN THE POOLS?

SPECTADRAW 2 - THE BEST SELLING POOLS PREDICTION PROGRAM FOR THE 48K ZX SPECTRUM

The program looks at the recent form of the teams playing in each week's English and Scottish football league matches and then refers to a large database to see what has happened in the past when teams with similar form met. By combining the lessons learnt from the past with the teams' current league position, the program generates a draw probability factor for each match. It can then identify the matches which are likely to yield draws and output suitable predictions. It will also output the least likely draws for the benefit of those who prefer the fixed odds lines on coupons.

Program, 8000 match database (both on high quality cassette) and instruction manual £12.95 inclusive.

NEW!!! SPECTASORT - THE PERM GENERATION PROGRAM

Spectasort takes the 14 most likely and 10 least likely draw predictions and produces ten 8 from 10 full over perms, enabling you to complete your pools coupon directly from the screen. The program will run on its own in 16K, using your own predictions, or has the unique feature of being able to merge with SPECTADRAW 2 to provide a complete Pools Prediction package!!

Spectasort program on high quality cassette £4.95 inclusive.

(Cheques/POs payable to B.S. McAlley)

SPECTADRAW
1 Cowleaze, Chinnor, Oxford OX9 4TD



The best books for the Commodore 64

The Working Commodore 64



The Working Commodore 64
A library of practical subroutines and programs.
"The style is easy to follow and informative" — *Personal Comp. News* August 18th 1983
ISBN: 0 946408 02 5

Commodore 64 Machine Code Master



Commodore 64 Machine Code Master
A library of machine code routines "At last a truly useful book for the machine code programmer. — and it's easy to read as well" *Popular Comp. News* 25 August 1983
ISBN: 0 946408 05 X

Commodore 64 Adventures



Commodore 64 Adventures
A blueprint for the construction and playing of Adventure programs based on a full text Adventure.
ISBN: 0 946408 11 4

Graphic Art for the Commodore 64



Graphic Art for the Commodore 64
How graphics facilities can be fully developed by using Turtle Graphics techniques
ISBN: 0 946408 15 7

Business Applications for the Commodore 64



Business Applications for the Commodore 64
Learn how to write your own packages
ISBN: 0 946408 12 2

Mathematics on the Commodore 64



Mathematics on the Commodore 64
Mathematical routines for use in programs
ISBN: 0 947408 14 9

Look out for the Sunshine range in W.H. Smith's, Boots, John Menzies, other leading retail chains and through our national network of book shops and specialist stores.

Dealer Enquiries: 01-437 4343

Please send me

- | | |
|---|---|
| <input type="checkbox"/> The Working Commodore 64 at £5.95 each | <input type="checkbox"/> Graphic Art for the Commodore 64 at £5.95 each |
| <input type="checkbox"/> Commodore 64 Machine Code Master at £6.95 each | <input type="checkbox"/> Business Applications at £5.95 each |
| <input type="checkbox"/> Commodore 64 Adventures at £5.95 each | <input type="checkbox"/> Mathematics on the Commodore 64 at £5.95 each |

I enclose cheque/postal order for £_____ made payable to: Sunshine Books: 12/13 Little Newport St., London WC2R 3LD
Or telephone Access Mastercard on 01-437 4343

Name _____

Address _____

Signature _____

We can normally deliver in 4/5 days.

SECURI TAPE

A MUST FOR ALL COMMODORE 64 OWNERS!!

- SECURES ALL YOUR GAMES AND UTILITIES ON SEPARATE TAPES, SAVES YOU POUNDS ON REPLACEMENTS.
- COPIES ALMOST ALL YOUR COMMODORE 64 TAPES.
- NO RISK TO ORIGINAL TAPES.
- SOME ALLOWANCE FOR LOAD ERRORS, COPY MAY LOAD AND RUN BETTER THAN THE ORIGINAL.
- FULL INSTRUCTION SET ON SCREEN WITH STEP BY STEP GUIDE.
- COST EFFECTIVE AT £10.99.

ALL
ORDERS PLACED
BEFORE 24.12.83
WILL RECEIVE
3 FREE
C15 CASSETTES

SEND CHEQUE OR P.O. FOR £10.99 PAYABLE TO MOS CONSULTANTS

ORDER FROM MOS CONSULTANTS, 434 CORN EXCHANGE, HANGING DITCH, MANCHESTER M4 3EY.

Name _____

Address _____

Tel. _____

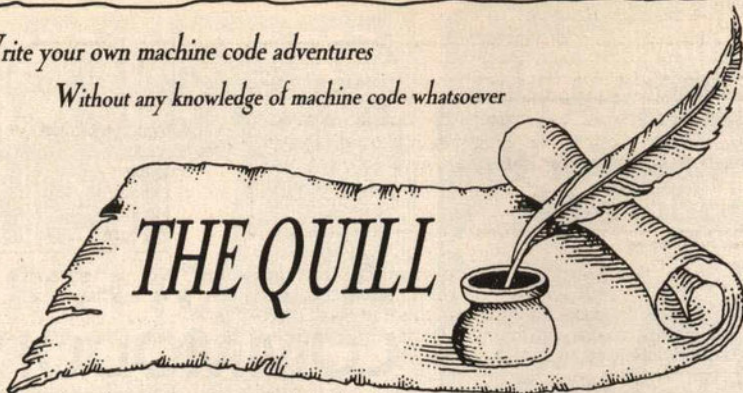
WARNING

IT IS AN OFFENCE TO USE THIS PROGRAM TO PROCESS COPYRIGHT MATERIAL FOR SALE, HIRE OR DISTRIBUTION

Write your own machine code adventures

Without any knowledge of machine code whatsoever

THE QUILL



THE QUILL is a major new utility written in machine code which allows even the novice programmer to produce high-speed machine code adventures of superior quality to many available at the moment without any knowledge of machine code whatsoever.

Using a menu selection system you may create well over 200 locations, describe them and connect routes between them. You may then fill them with objects and problems of your choice. Having tested your adventure you may alter and experiment with any section with the greatest of ease. A part formed adventure may be saved to tape for later completion. When you have done so *THE QUILL* will allow you to produce a copy of your adventure which will run independently of the main *QUILL* editor, so that you may give copies away to your friends.

THE QUILL is provided with a detailed tutorial manual which covers every aspect of its use in writing adventures. It is impossible to describe all the features of this amazing program in such a small space so we have produced a demonstration cassette which gives further information and an example of its use.

This demo-cassette is available at £2.00, and *THE QUILL* itself at £14.95.

FOR THE 48K SPECTRUM AT £14.95

Our Software is now available from many computer shops nationwide, or direct from us by post or telephone.

SAE for full details of our range.

Dealer enquires welcome.

GILSOFT

30 Hawthorn Road
Barry
South Glamorgan
CF6 8LE
☎(0446) 736369

TELEPHONE YOUR ORDER
WITH



The best books for the Spectrum



Spectrum Adventures
A major work by Tony Bridge and Roy Carnell detailing the growth and development of Adventure Gaming.

ISBN: 0 946408 07 6



The Working Spectrum
A library of practical subroutines and programs by David Lawrence.

ISBN: 0 946408 00 9



Spectrum Machine Code Applications
David Laine explains a collection of practical machine code routines.

ISBN: 0 946408 17 3

Look out for the Sunshine range in W.H. Smith's, Boots, John Menzies, other leading retail chains and through our national network of book shops and specialist stores.

Dealer enquiries:
01-734 3454.

Please send me

- ☐ The Working Spectrum at £5.95 each
- ☐ Spectrum Adventures at £5.95 each
- ☐ Spectrum Machine Code Applications at £6.95 each
- ☐ Cruising at £4.95 each
- ☐ Blind Alley at £4.95 each
- ☐ Androids at £5.95 each
- ☐ Swordfight at £5.95 each
- ☐ Galaxy Attack at £5.95 each

I enclose a cheque/postal order for £
made payable to Sunshine Books,
12/13 Little Newport St.,
London WC2R 3LD

Name

Address

Signature

Or telephone Access Mastercard

on 01-734 3454

Sunshine Spectrum Software

- * Cruising — 16K RAM
- * Androids — 16K RAM
- * Blind Alley — 16K RAM
- * Sword Fight — 16K RAM
- * Galaxy Attack — 48K RAM

OPEN FORUM

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

Bug Fever

on Spectrum

In this game you control a frog on a lily pond surrounded by reeds. The aim of the

game is to catch as many insects with the frog's sticky tongue as possible. You have 60 seconds in which to do this, four additional seconds are taken away if you jump into the pond. Scores vary depending on the type of insect you catch, ie,

dragonflies, butterflies, or flies. Controls are:

- 5—Skip left
- 8—Skip right
- 6—Jump left
- 7—Jump right

0—Release the frog's tongue.

When a game finishes the program goes into demo mode and you can press 'r' to re-start a new game. When keying in the listing, first run the user defined character part.

```

1 DATA 14,17,17,35,37,42,116,
53,96,152,8,16,32,132,248,96,1
56,66,46,12,7,5,9,3,4,100,161,223
4,100,4,12,24,32,64,170,85,64,32,2
24,0,0,192,64,61,255,62,32,0,127
1,0,1,127,0,0,3,14,255,255,255,
14,3,0
2 DATA 240,0,128,128,128,0,24
0,0,0,0,130,130,130,186,186,6
254,124,124,56,56,56,106,68,6
3,66,66,66,66,0,34,34,34,34,34
34,54,26,28,28,28,62,62,127,93,
93,66,66,66,66,0,0,112,216,124
126,255,127,63,255
3 DATA 14,27,62,126,255,254,2
52,255,248,0,128,255,128,0,248,0
1,0,0,254,128,0,128,254,0,0,192,1
12,255,255,255,112,192,0,15,0,1,
4,1,0,15
4 RESTORE : FOR q=0 TO 167 ST
EP 8: FOR r=0 TO 7: READ a: POKE
USR "Q"+q+,a: NEXT r: NEXT q
10 DATA BIN 1010010,BIN 010101
01,BIN 01010101,BIN 00101011,BIN
00101011,BIN 10010111,BIN 10001
111,BIN 01111111,BIN 01100101,BI
N 01101010,BIN 10101010,BIN 1101
0100,BIN 11010100,BIN 11101001,B
IN 1110001,255
15 DATA BIN 1010010,BIN 010101
01,BIN 01010101,BIN 00101011,BIN
00101011,BIN 10010111,BIN 10001
111,BIN 01111111,BIN 01100101,BI
N 01101010,BIN 10101010,BIN 1101
0100,BIN 11010100,BIN 11101001,B
IN 1110001,255
20 DATA 14,17,17,35,37,42,116,
53,96,152,8,16,32,132,248,96,1
900 BORDER 5: PAPER 8: BRIGHT 1
CLS: FOR n=0 TO 10: PRINT AT
n,0: PAPER 5: NEXT n: FOR n=11
TO 21: PRINT AT n,0: PAPER 1:
NEXT n
901 INK 7: FOR r=0 TO 60 STEP 1
6: FOR q=0+RND*4 TO 255 STEP 16:
PLOT q,r: DRAW 2,2: DRAW 2,-1:
NEXT q: NEXT r
911 LET time=60: LET score=0
912 INK 1: PAPER 4: PRINT AT 17
3:
913 PRINT AT 18,3:
914 PRINT AT 19,3:
915 INK 0: PAPER 4: PLOT 35,26:
DRAW 170,0
916 FOR n=45 TO 190 STEP 3: PLO
T n,26: DRAW 6,8: DRAW -8,-8: DR
AW 8,-6: NEXT n
917 FOR n=0 TO 255: PLOT INK 4:
n,8: DRAW INK 4,0:INT (RND*8): N
EXT n
918 RESTORE 10: FOR n=0 TO 15:
READ a: POKE USR "Q"+n,a: NEXT n
919 PRINT AT 19,1: INK 3: PAPER
1:
920 AT 16,3: INK 6: PAPER 1:
921 AT 16,26: INK 7: PAPER 1:
922 AT 19,26: INK 6: PAPER 1:
923 RESTORE 20: FOR n=0 TO 15:
READ a: POKE USR "Q"+n,a: NEXT n
930 FOR q=1 TO 0 STEP -1: PLOT
INK 6,224,175: DRAW INK 6,31,-q
+4,q: NEXT q
940 OVER 0: FOR r=40 TO 200: FO
R q=1 TO 4: PLOT INK 3,r+q,16: D
RAW INK 3,0,12: NEXT q: LET r=r+
INT (10+RND*20): NEXT r

```

```

1010 PAPER 8: INK 0: REM
1015 PRINT AT 21,0: PAPER 4:
1016 PRINT AT 21,11: INK 7: BUGF
EVER
1020 LET x=16: LET y=13
1021 PRINT AT x,y: INK 7:
1025 LET z=10
1026 GO TO 5360
5016 REM
5020 FOR n=x-3 TO x-z+(3 AND y)=
25 AND z>3 STEP -1: INK 0+(7 AN
D n>10): BRIGHT 1: PRINT AT n,y:
" " AT n+1,y: " " AT n+2,y: " " AT
n+3,y: GO SUB 6050
5030 NEXT n
5035 PRINT AT n+1,y: " " AT n+2,y
" " AT n+3,y:
5040 FOR p=y TO y+4-(3 AND y)=25
)
5050 PRINT AT n,p: " "
5051 IF INKEY$="0" THEN BEEP .01
5052 IF (SCREEN$ (n,p+4) <> " ") A
ND INKEY$="0" THEN PRINT AT n,p+
3: INK 2: " " FOR r=5 TO 1 STEP
-1: BEEP .01: NEXT r: PRINT A
T a,b-1: LET score=score+
sc1: GO SUB 5310
5053 GO SUB 6050
5060 NEXT p
5061 LET time=time-(4 AND z<>3) -
(4/10 AND z=3)
5065 PRINT AT n,p-1:
5070 FOR n=x-z+(3 AND y)=25 AND
z>3 TO x: INK 0+(7 AND n>10): P
RINT AT n-3,y+4: " " AT n-2,y+4:
" " AT n-1,y+4: " " AT n-4,y+4:
GO SUB 6050
5080 NEXT n
5085 PRINT AT n-4,y+4: " " AT n-3
,y+4: " " AT n-2,y+4:
5090 LET y=y+4: PRINT AT x,y: IN
K 7:
5095 BEEP .01,-20: BEEP .01,-10
5096 IF y=29 THEN LET time=time
-3: PRINT AT x,y: INK 1: INK
-3: FOR n=1 TO 20: BEEP .003 n:
PLOT 235,32: GO SUB 6050: DRAW 1
NT (-10+RND*20):INT (RND*15): NE
XT n: GO SUB 6050: FOR q=16 TO 1
8: PRINT AT q,26: PAPER 1:
GO SUB 9120: GO SUB 6050: NEXT
q: LET x=16: LET y=13
5100 RETURN
5110 REM
5120 FOR n=x-3 TO x-z STEP -1: I
NK 0+(7 AND n>10): PRINT AT n,y:
" " AT n+1,y: " " AT n+2,y: " " AT
n+3,y: GO SUB 6050
5130 NEXT n
5135 PRINT AT n+1,y: " " AT n+2,y
" " AT n+3,y:
5140 FOR p=y TO y-4 STEP -1
5150 PRINT AT n,p: " " GO SUB
6050: POKE USR "3"+4,4
5155 IF INKEY$="0" THEN BEEP .01
5156 IF (SCREEN$ (n,p-1) <> " ") A
ND INKEY$="0" THEN POKE USR "3"+
4,255: FOR r=5 TO 1 STEP -1: BEE
P .01: NEXT r: PRINT AT a,b-1
LET score=score+sc1: G
O SUB 5310
5160 NEXT p
5161 LET time=time-(4 AND z<>3) -
(4/10 AND z=3)
5165 PRINT AT n,p+1:
5170 FOR n=x-z TO x: INK 0+(7 AN

```







OPEN FORUM

```

D n>10): PRINT AT n-3,y-4;"U";AT
n-2,y-4;"A";AT n-1,y-4;"H";AT n
-4,y-4;" ": GO SUB 6050
5105 NEXT n
5106 PRINT AT n-4,y-4;" ";AT n-3
y-4;" ";AT n-2,y-4;" ";
5109 LET y=y-4: PRINT AT x,y;" "
5109 BEEP .01,20: BEEP .01,10
5109 IF y<3 THEN LET time=time-
3: PRINT AT x,y: INK 1;" ": INK
7: FOR n=1 TO 20: BEEP .003,n: P
LOT 11,32: GO SUB 6050: DRAW INT
(-10+RND*20),INT (RND*10): NEXT
n: GO SUB 6050: FOR q=16 TO 16:
PRINT AT q,0: PAPER 1;" ": GO
SUB 9110: GO SUB 6050: NEXT q:
LET x=16: LET y=13
5200 RETURN
5300 REM Flies
5310 LET a=INT (1+RND*7): LET b1
=INT (1+RND*3)
5320 IF b1=1 THEN LET a$=" "
LET d=-1: LET d1=0: LET b=29: LE
T sc1=150
5330 IF b1=2 THEN LET a$=" "
LET d=-1: LET d1=0: LET b=29: LE
T sc1=200
5340 IF b1=3 THEN LET a$=" "
LET d=1: LET d1=29: LET b=0: LET
sc1=50
5350 RETURN
5360 GO SUB 5310
5400 GO SUB 6050
5401 PRINT AT 21,0: INK 7;"TIME:
":INT time AND time>0;"":AT 21
,23: INK 7;"SCORE:";score
5402 IF time<=0 THEN LET time=0:
PRINT AT 10,9: INK 7: PAPER 4:
GAME-OVER " ": GO TO 9000
5405 IF INKEY$="8" THEN LET z=3:
BEEP .01,5: GO SUB 5015:
5410 IF INKEY$="7" THEN LET z=x-
3-1: BEEP .01,7: GO SUB 5015:
5420 IF INKEY$="5" AND y>1 THEN

```

```

LET z=3: BEEP .01,5: GO SUB 5120
5430 IF INKEY$="6" AND y>1 THEN
LET z=x-3-1: BEEP .01,6: GO SUB
5120:
5435 LET time=time-1/10
5440 GO TO 5000
5450 PRINT AT a,b: INK 0;a$
5460 LET b=b+d: IF b=d1 THEN PRI
NT AT a,b-1;" ": GO SUB 5210
5465 BEEP .001,b
5470 RETURN
5480 IF INKEY$<>"r" THEN GO TO 5
000
5485 PRINT AT 1,12;"SCORING";AT
2,12;"-----"
5490 PRINT AT 4,3;" DRAGONFLI
ES-----200"
5494 PRINT AT 6,3;" BUTTERFLI
ES-----150"
5497 PRINT AT 8,3;" FLIES-----
50"
5498 FOR n=1 TO 50: NEXT n
5499 IF INKEY$<>"r" THEN GO TO 9
000
5100 FOR n=1 TO 10: PRINT AT n,0
: PAPER 5: INK 7;" ": NEXT n: PRI
NT AT 21,26: PAPER 4: INK 4;"
": PRINT AT x,y;" ": LET score=
0: LET z=10: LET x=16: LET y=13:
LET time=61: PRINT AT x,y: INK
7;" ": GO TO 5360
5110 INK 7: FOR n=0 TO 16 STEP 1
6: PLOT n,32: DRAW 2,1: DRAW 2,-
1: NEXT n: PRINT AT 16,13;"": R
ETURN
5120 INK 7: FOR n=0 TO 16 STEP 1
6: PLOT n+230,32: DRAW 2,1: DRAW
2,-1: NEXT n: PRINT AT 16,13;"":
RETURN

```

Bug Fever
by Simon Cox

Double Height on Vic20

The program doubles the height of all the characters on an unexpanded Vic. Although short it can be very useful for display effects.

```

10 FOR I = 1 TO 1024
20 B = PEEK ( Y + 32768 )
30 POKE 5120 + X,B
40 POKE 5121 + X,B
50 X = X + 2 : Y = Y + 1
60 NEXT I
70 PRINT CHR$ (147)
80 POKE 36867,155
90 POKE 36869,253

```

Double Height
by Julian Storer

Elements

on BBC

This program should help to remind you of the main features of the first 20 elements.

Program notes

40 Asks for Element

60-100 Reads and checks Data
110-230 Main section
240-250 Another run?
280-480 Data

Variables

A\$ Element
C Atomic number

D Atomic weight
E\$ Elements symbol
F\$ Electron arrangement
H Number of electrons
I Number of protons
G The atomic group

To return the copy keys back to their copy function type: 245 *FX4.

```

>LIS
10REM ELEMENTS KNOW
20*FX4,4
30MODE 7:VDU23:8202:0:0:0:
40PRINT"ENTER ELEMENT TO BE REVISED"
50
60INPUT B$
70READ A$,C,D,E$,F$,H,I,G
80IF A$="Z" THEN 260
90IF B$=A$ THEN 110
100IF B$<>A$ THEN 70
110PRINT"ELEMENT ";A$
120PRINT"ATOMIC NUMBER ";C
130PRINT"ATOMIC WEIGHT ";D
140PRINT""What is ";A$;"'s symbol ";
150INPUT J$:IF J$<>E$ THEN PRINT"WRONG.ELEMENT ";A$;"'S SYMBOL
    IS ";E$:ELSE PRINT"CORRECT"
160PRINT""What is the electron arrangement(start by ";CHR$(34);"
    and finish with ";CHR$(34);")"
170INPUT J$:IF J$<>F$ THEN PRINT"ELECTRON ARRANGEMENT:";F$:ELSE
    PRINT"CORRECT"
180PRINT"How many neutrons in this element"
190INPUT J:IF J=H THEN PRINT"CORRECT" ELSE PRINT"NO. OF
    neutrons=atomic weight -atomic number.Which is ";H
200PRINT"How many protons in this element "
210INPUT J:IF J=I THEN PRINT"CORRECT" ELSE PRINT"no. of
    protons=atomic number. Which is ";I
220 PRINT"Which group is this element in?";
230 INPUTJ:IF J=G THEN PRINT"CORRECT" ELSE PRINT"GROUP=no.
    of electrons on the outer shell of the atom"
240PRINT"ANOTHER ELEMENT";
250J$=GET$:IF J$="Y" THEN CLS:GOTO 40 ELSE END
260PRINT"ELEMENT IS NOT IN THE FIRST TWENTY ELEMENTS."
270PRINT"PLEASE TRY AGAIN":FOR=1 TO 1000:NEXT:RUN
280DATAHYDROGEN,1,1,H,"1",0,1,1
290DATAHELIUM,2,4,He,"2",2,2,2
300DATA LITHIUM,3,7,Li,"2,1",4,3,1
310DATA BERYLLIUM,4,9,Be,"2,2",5,4,2
320DATA BORON,5,11,B,"2,3",6,5,3
330DATA CARBON,6,12,C,"2,4",6,6,4
340DATA NITROGEN,7,14,N,"2,5",7,7,5
350DATA OXYGEN,8,16,O,"2,6",8,8,6
360DATA FLUORINE,9,19,F,"2,7",10,9,7
370DATA NEON,10,20,Ne,"2,8",10,10,8
380DATA SODIUM,11,23,Na,"2,8,1",12,11,1
390DATA MAGNESIUM,12,24,Mg,"2,8,2",12,12,2
400DATA ALUMINIUM,13,27,Al,"2,8,3",14,13,3
410DATA SILICON,14,28,Si,"2,8,4",14,14,4
420DATA PHOSPHORUS,15,31,P,"2,8,5",16,15,5
430DATA SULPHUR,16,32,S,"2,8,6",16,16,6
440DATA CHLORINE,17,35.5,Cl,"2,8,7",16,5,17,7
450DATA ARGON,18,36,Ar,"2,8,8",18,18,8
460DATA POTASSIUM,19,39,K,"2,8,8,1",20,19,1
470DATA CALCIUM,20,40,Ca,"2,8,8,2",20,20,2
480DATA Z,0,0,X,"0",0,0,0
    
```

Elements
by Kenneth Adair

Arcade software for COMMODORE 64 Action-packed 100% Machine Code



£6.95

Scale the ladders to get your Space Hammer but watch out for the homicidal "Meenies", the slightest touch and you'll be electrocuted. Once the Hammer is in your hands you can start to rid the world of the meenies: chase them up and down the ladders, through the escape door, lure them into the holes dug with your space hammer. When you trap one, rush over and BONK him on the head. But HURRY! If you loiter he will climb out, fill in the hole, and then home in on you, flashing in anger! To add to your problems your oxygen is running out and the meenies move faster the more you kill.

A superb arcade-style game with Hall of Fame. Uses one joystick.



£6.95

"There in the sky I saw the screaming alien birds. They had come to invade our planet. People ran in wild panic and desperation in some vain hope of escape. But there was no escape. The aliens swooped out of the sky killing anyone in their path. I alone decided to stay and fight, but then the eggs hatched and the true horror began. . . ."

A fast-moving Galaxian type arcade game with Hall of Fame and bonus lives. Uses one joystick.

LATES RELEASE — AVAILABLE NOW! CYBERMEN — £6.95

You, our hero, attempt to remove the platinum from the Cosmic space station inhabited by the Cybermen. Programmed to destroy all intruders, their duty is to protect the precious metal. For safe keeping this has been distributed throughout the random maze of corridors of which the space station consists. Not only do the Cybermen home in on you but you will be electrocuted if you touch the maze walls. Your phaser will kill the Cybermen but the corridors are also patrolled by the indestructible overseer who possesses the unearthly power of moving through walls.

All orders despatched by return first class post.

Callers and Trade enquiries welcome.

Dept PCW 13, 2 Glensdale Street, Leeds LS9 9JJ

Telephone (0532) 480987

J. MORRISON (MICROS) LTD.

Suppliers of quality machine code software since 1978

TOWN NATHAN HOME COMPUTERS, SOFTWARE, BOARD GAMES, ROLE PLAYING GAMES AND BOOKS

WEST YORKSHIRE'S LOCAL COMPUTER SHOPS

MORLEY —

DRAGON BYTE

51a Queen Street

Morley

Leeds 25

Tel: 0532 522690

HEADINGLEY —

LAST CHANCE

10 Ash Road

Headingley

Leeds 6

Tel: 0532 744235

CROSSGATES —

HIEROMANS DELL

89 Penda's Way

Leeds 15

Tel: 0532 641855

We're worth a visit because:

- ★ We've probably the best range of software in the North — and we're improving all the time.
- ★ We've a growing range of computers, peripherals, upgrades and books.
- ★ We've the biggest range of Citadel figures for leagues around.
- ★ We've board and adventure games for all ages from TSR, Games Workshop, Avalon Hill, Victory Games, GDW, Yaquina, etc, etc.

PROGRAMMERS — Assassin Software needs your marketable programs. Give us a call.

Shards
SOFTWARE

**CHRISTMAS
CATALOGUE**

Shards
SOFTWARE

NEW RELEASES

JERICHO ROAD (Spectrum 48K): Full featured educational adventure set in biblical times. Explore southern Israel, meeting people and visiting places from the pages of the Bible. Ideal family Christmas present. **£5.75.**

HOOKED! (Dragon 32): Entertaining graphical fishing game for 1 or 2 players. Suitable for all ages. Many levels of play, with optional joysticks. **£5.75.**

MONSTER MATHS (Dragon 32): Maths education for 8-14-year-olds. Menu driven, with five functions and nine levels of difficulty. **£6.95.**

SCIENCE 1 (BBC B): Physics education for 11-16-year-olds. Covers, lenses, mirrors, balances, meters and thermometers. With full documentation. **£6.95.**

EMPIRE (BBC B): Exciting strategy game for all ages. With eight difficulty levels. Save the world from the evil Empire! **£6.95.**

ALSO AVAILABLE

DRAGON 32: Pettigrew's Diary (£7.95). "I have nothing but praise for this unorthodox adventure". *Micro Adventurer*, Empire (£6.95). "An extremely good game . . . Highly recommended". *PCN* November 17, 1983. Quiz Pack (£3.95), Infant Pack (£3.95), Junior Pack (£3.95), Puzzler (£6.95), Family Programs (£6.95), Fun and Games (£6.95), Live and Learn (£6.95), City Defence (£5.75), Fun to Learn (£6.95).

BBC B: Fun to Learn (£6.95), Monster Maths (£6.95).

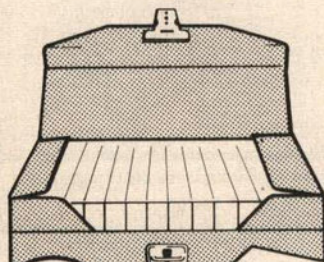
LYNX: Grid Attack (£4.95).

SEE US AT THE WEMBLEY CHRISTMAS FAIR, December 15-18, STAND 259.

AVAILABLE NOW FROM SELECTED BRANCHES OF BOOTS AND ALL GOOD STOCKISTS
or send cheque/PO to **SHARDS SOFTWARE, 189 ETON ROAD, ILFORD, ESSEX IG1 2UQ**

PROTECT YOUR VALUABLE SOFTWARE MAGAZINES AND TAPES

Designed specifically for the protection of valuable cassettes and magazines. Supplied in strong black plastic.



CASSETTE CASE

A must for the storage of tapes. Sized to hold 12 standard C type cassettes.

£2.50
+ p & p

£1.99
+ p & p

MAGAZINE CASE (305 x 214 x 30mm). Stop searching for those lost articles! Holds most weekly and monthly computer magazines.

Mail with cheque/postal order to:

SSS

61 Uppate, LOUTH
Lincolnshire LN11 9HD

PLEASE ALLOW 28 DAYS FOR DELIVERY

QUANTITY	ITEM	PRICE	TOTAL
	CASSETTE CASE		
	MAGAZINE CASE		
Add 30p P & P/ITEM			

*Dealer enquiries welcome. Export prices on application

PLEASE PRINT CLEARLY

Name

Address

Micromail

LOW COST SOFTWARE

DRAGON 32 Program Name	Supplier	Price inc VAT
Alcatraz	Microdeal	8.00
Backgammon	Microdeal	8.00
Cosmic Zap	Microdeal	8.00
Cuthbert Goes Walkabout	Microdeal	8.00
Defense	Microdeal	8.00
Dragon Invaders	Microdeal	8.00
Flipper	Microdeal	8.00
Frogger	Microdeal	8.00
Golf	Microdeal	8.00
Invaders Revenge	Microdeal	8.00
Jerusalem Adventure 2	Microdeal	8.00
Katerpillar Attack	Microdeal	8.00
Mansion Adventure 1	Microdeal	8.00
Monaco Grand Prix	Microdeal	8.00
Planet Invasion	Microdeal	8.00
Scarfman	Microdeal	8.00
Shuttle	Microdeal	8.00
Space War	Microdeal	8.00
Talking Android Attack	Microdeal	8.00
The King	Microdeal	8.00
Williamsburg Adventure	Microdeal	8.00
Ultimate Adventure 4	Microdeal	8.00

COMMODORE 64 Program Name	Supplier	Price inc VAT
Sprite/Graphics	Rabbit	5.99
Escape MCP	Rabbit	5.99
Pakacuda	Rabbit	5.99
Centipede	Rabbit	5.99
Cyclons	Rabbit	5.99
Monopolee	Rabbit	5.99
Annihilator	Rabbit	5.99
Paratroopers	Rabbit	5.99
Potty Painter	Rabbit	5.99
Lancer Lords	Rabbit	5.99

VIC20 Programme Name	Supplier	Model	Price inc VAT
Arcadia	Imagine	Unex	5.50
Wacky Waiters	Imagine	Unex	5.50
Catcha Snatcha	Imagine	Unex	5.50
Frantic	Imagine	Unex	5.50
Skyhawk	Quicksilva	3K	7.95
Tornado	Quicksilva	Unex	5.95
Harvester + Brainstorm	Quicksilva	7.95	
Pival Power	Quicksilva	16K	7.95
Trader	Quicksilva	16K	14.95
Subspace Striker + Zor	Quicksilva	16K	7.95
Starquest + Encounter	Quicksilva	16K	7.95
Paratrooper	Rabbit	Unex	5.99
Antimatter Splatter	Rabbit	Unex	5.99
The Catch	Rabbit	Unex	5.99
English Invaders	Rabbit	Unex	5.99
Pakacuda	Rabbit	Unex	5.99
Escape MCP	Rabbit	Unex	5.99
Critters	Rabbit	8K	5.99
Cyclons	Rabbit	8K	5.99
Race Fun	Rabbit	Unex	5.99
Skramble	Rabbit	Unex	5.99
Myriad	Rabbit	8K	5.99
Quackers	Rabbit	Unex	5.99
Atom Smasher	Romik	Unex	6.99
Martian Raider	Romik	Unex	6.99
Moons of Jupiter	Romik	3K	7.99
Multisound Synthesizer	Romik	Unex	6.99
Shark Attack	Romik	Unex	5.99
Space Attack	Romik	Unex	5.99
Power Blaster	Romik	Unex	5.99
Time Destroyers	Romik	3K	6.99

SPECTRUM Program Name	Supplier	Model	Price inc VAT
Arcadia	Imagine	16K	5.50
Schizoids	Imagine	16K	5.50
Ah Diddums	Imagine	16K	5.50
Molar Maul	Imagine	16K	5.50
Jumping Jack	Imagine	16K	5.50
Zip Zap	Imagine	48K	5.50
Zzoom	Imagine	48K	5.50
Over the Spectrum 1	Melbourne	16K	5.95
Over the Spectrum 2	Melbourne	16K	5.95
Over the Spectrum 3	Melbourne	16K	5.95
Penetrator	Melbourne	48K	6.95
The Hobbit + Book	Melbourne	48K	14.95
Progs Frm Spec Mcn Lang	Melbourne	16K	5.95
Terror Daktil 40	Melbourne	48K	6.95
Trader	Quicksilva	48K	9.95
The Word Processor	Quicksilva	48K	5.95
Mined-Out	Quicksilva	48K	4.95
Timegate	Quicksilva	48K	6.95
Easyspeak	Quicksilva	48K	4.95
Astroblaster	Quicksilva	16K	4.95
Frenzy	Quicksilva	16K	4.95
Meteor Storm	Quicksilva	16K	4.95
Space Intruders	Quicksilva	16K	4.95
Aquaplane	Quicksilva	48K	6.95
Xadom	Quicksilva	48K	6.95

All the above items at 15% below list price until
January 31, 1984.

Cash with order
MICROMAIL LTD, PO BOX 34 (DEPT PCW)
Leighton Buzzard LU7 8SJ

Barclaycard/Access accepted

TNT**SOFTWARE**

CENTIMUNCH

Special introduction offer
£5.95 (inc P&P and VAT)

FOR THE 48K SPECTRUM

An original game with on-screen scoring plus Hi-Score. Watch out for the Spider, mind the Bees don't confuse. Remember eat all your veg, a Super Carrot can improve your eyesight — now you can see the gate. Careful round those Rocks. Can you survive a full 12 months in a garden like this?

**DEALER ENQUIRIES WELCOME —
RING 0229 27324**

Please send Cheques or P/Os to:
**T.N.T. Software, Dept B
Melton House, Lindal
Ulverston, Cumbria**

I ENCLOSE £.....
NAME
ADDRESS

SUPERCODE

—for 16K and 48K Spectrum

100+ ROUTINES

This is a superior machine code tool kit with one hundred machine code routines that are relocatable for use in your own BASIC and/or machine code programs, the combined user friendly BASIC program, 48K Spectrum only, gives easy access to all routines. • Index of routines. • Call up details of each routine including all information required to tailor the routine to your needs. • Demonstration of how the routine works under software control, the demonstration is repeatable. • Save and verify individual routines. • Comprehensive user guide.

1. Block Memory Insert	24. Sci-Fi Character Set	47. Wait-Key
2. Block Line Delete	25. Memory Available	48. Strings to Upper Case
3. Chr\$ Swap	26. Line Renumber	49. Strings to Lower Case
4. Chr\$ Scramble	27. Uni-Note Sound-Gen	50. Program to Upper Case
5. Super-Remumber	28. Dual Note Sound-Gen	51. Program to Lower Case
6. 2 Byte Converter	29. Uni-BEEP Simulator	52. Confuse
7. Dec - Hex Converter	30. Multi-BEEP Simulator	53. Clarify
8. Hex - Dec Converter	31. Screen Fill	54. Space Saver
9. Remkill Condenser	32. Screen Store	55. Screen Overprint
10. On Error Goto	33. Screen Exchange	56. Screen Invert
11. On Break Goto	34. Protect Program	57. Clear All
12. Free-Scroller	35. Block Copy	58. Ink Change
13. Non-Deletable Lines	36. Contract	59. Paper Change
14. Border Effects	37. Expand	60. Flash On
15. Screen Search	38. Expand Rem	61. Flash Off
16. Variables Search/List	39. Append	62. Bright On
17. 24-Line Printing	40. Count Program	63. Bright Off
18. Star Draw	41. Tape Header Reader	64. Screen-Punt
19. Flash Switch	42. Address	65. Rand - Number Generator
20. Bright Switch	43. Checker-Board	
21. Paint Shape	44. Remove Colours	
22. Record Sound	45. Display Memory	
23. Replay Sound	46. Hex Loader	

Routines 66-100: Screen routines
SUPERCODE £9.95

Also available at Boots, W.H. Smith and all good computer shops.
DELIVERY: Send SAE for Catalogue.

UK—prices include VAT and postage & packing.

EUROPE—add 80p per program

ALL OTHER PLACES—for air mail add £2 for the first program and 50p for each subsequent program. Surface delivery add 80p per program.

CP software

Send Cheque, Postal Order or Access No. to:
**CP SOFTWARE, Dept PCW1A
17 Orchard Lane, Prestwood,
Bucks HP16 0NN**



HISOFT PASCAL DEVPAC

Quality ZX SPECTRUM* Software

HISOFT PASCAL 4T

"... I haven't seen any other compiler that could match Hisoft's Pascal" ... Using the Spectrum Micro - Autumn 1983

"This is a very impressive product ... of benefit to any Spectrum programmer ..." David Bolton ZX COMPUTING Aug/Sept 1983

Just two comments from full length reviews of our powerful and virtually full implementation of Standard Pascal. The advantages of using Pascal are well-known — fast, self-documenting, and above all, structured programs and now, with Hisoft Pascal, you can reap all these benefits on a wide range of home computers, including the 48K Sinclair Spectrum! Hisoft Pascal produces programs that run typically 40 times faster than equivalent ZX BASIC programs and, sometimes, up to 1,000 times faster!

Hisoft Pascal supports FOR ... DO, WHILE ... DO, REPEAT ... UNTIL, CASE ... OF, INTEGERS, REALS, CHARACTERS, RECORDS, POINTERS, SETS, ARRAYS etc. etc. — it is not a Tiny Pascal but a virtually full implementation of the language allowing the user to develop true high-level language skills while attaining execution speed close to that of machine code. Complete with a 70-page manual.

HISOFT DEVPAC 3

"... DEVPAC is most highly recommended. The documentation is first class." Your Computer May 1983

"... if you write programs in machine code, buy DEVPAC — it is the best currently on the market." Adam Denning, ZX SOFT in Which Micro September 1983

Two comments from reviews of earlier versions of DEVPAC — now we have DEVPAC 3 available: a powerful Z80 assembler with conditional assembly, assembly from tape (to enable generation of very large code files), ORG, EQU, DEFB, DEFS, DEFW, DEFM, labels of any length — in fact all you need for fast (3,000 lines per minute) and powerful assembly programming. But it doesn't stop there: DEVPAC 3 also includes an incredible debugger/dis-assembler giving you a 'front panel' display of the Z80 system and allowing extensive debugging of your machine-code program, including single-stepping programs EVEN IN ROM!! Open up the secrets of low-level programming with DEVPAC 3.

Prices:
Hisoft Pascal 4T (ZX SPECTRUM) £25 inclusive
(NewBrain, SHARP MZ700 etc) £35 plus VAT
Hisoft DEVPAC 3 (ZX SPECTRUM) £14 inclusive
(NewBrain £25 inclusive)

STOP PRESS Hisoft Pascal for the SPECTRUM now comes complete with a Turtle Graphics package allowing fast and easy production of complex graphic displays

HISOFT

13 Gooseacre, Cheddington
Leighton Buzzard, Beds. LU7 0SR
Tel: (0296) 668995



OPEN FORUM

Pre-defined Sounds

on Dragon

This short machine code routine shows

what can be done on the Dragon when using machine code. It gives three pre-defined sound effects which are an explosion, laser and gunshot. The sounds are accessed by the *USRO* (value) function whose value is a number between 1 and 3.

I have included a check sum to check for data errors.

As a final point I have discovered a strange *Rom* routine which deletes all the line numbers from any Basic program. To try it Exec 35996.

```

10 *****
20 **** Popular Computing ****
30 **** Weekly ****
40 ****PRE-DEFINED SOUNDS****
50 ****BY N. EDMUNDS 1983. ****
60 ****FOR THE DRAGON 32. ****
70 *****
80 'USRO(1)=GUNSHOT
90 'USRO(2)=LASER
100 'USRO(3)=EXPLOSION
110 REM CLEAR 200,32000
120 DATA BD,8B,27,5D,27,04,C1,03,23,05,C6,02,7E,B3,44,C1,
    01,26,37,34,12,B6,FF,23,8A,08,B7,FF,23,7F,01,47,8E,B7,
    98,AE,80,8D,14
130 '
140 DATA A6,80,8D,10,7A,01,47,26,F3,B6,FF,23,84,F7,B7,FF,
    23,35,12,39,B4,01,47,B7,FF,20,86,41,4A,26,FD,39
150 '
160 DATA 12,12,12,12,12,C1,02,26,37,34,32,B6,FF,23,8A,08,
    B7,FF,23,8E,00,01,86,FD,B7,FF,20,8D,17,7F,FF,20,8D,12,
    30,01,8C,00,9B,25,ED
170 '
180 DATA B6,FF,23,84,F7,B7,FF,23,35,32,39,1F,12,31,3F,26,
    FC,39,12,12,12,12
190 '
200 DATA 12,12,12,12,12,34,12,B6,FF,23,8A,08,B7,FF,23,7F,
    01,47,8E,B7,98,AE,80,8D,14,AE,80,8D,10,7A,01,47,26,F3,
    B6,FF,23,84,F7
210 '
    
```

```

220 DATA B7,FF,23,35,12,39,B4,01,47,B7,FF,20,86,FE,4A,26,
    FD,39
230 'END OF DATA
240 '***BASIC LOADER FOR CODE****
250 DATA "END"
260 READ A$:IF A$="END" THEN 320
270 LET X=VAL("&H"+A$)
280 POKE 32000+X,X
290 CS=CS+X
300 C=C+1
310 GOTO 250
320 IF CS(0)19623 THEN PRINT"DATA ERROR.":STOP
330 DEF USR0=32000
340 PRINT"GUNSHOT=USRO(1)"
350 FOR D=1 TO 300:NEXT D
360 A=USR0(1):1=LASER.
370 PRINT"LASER=USRO(2)" 2=LASER.
380 FOR D=1 TO 300:NEXT D
390 A=USR0(2)
400 PRINT"EXPLOSION=USRO(3)"
410 FOR D=1 TO 300:nextd
420 A=USR0(3):3=EXPLOSION.
430 *****
User functions:-
USRO(1)=Gunshot sound.
USRO(2)=Laser sound.
USRO(3)=Explosion sound.
    
```

Pre-defined sounds
by N Edmunds

Telephone

on Spectrum

This program is a menu-driven user-friendly telephone directory for either model of Spectrum. The 48K Spectrum will allow for about 600-700 entries. The necessary alterations for 16K are included below. To alter the program for n entries:

Line 200 to: 200 Dim L\$(n,32)
Line 2060 to: 2060 For A = 1 to n
Line 2143 to: 2143 For A = 1 to n
Line 3050 to: 3050 For A = 1 to n

Program notes

20 Colours.
30 Poke Caps Lock.
40-90 Print menu.
200-230 Variables.
1000-1100 ADD an entry routine.
2000-2190 DELETE an entry routine.
3000-3080 SEARCH for an entry routine.

4000 EXIT from program.

5000-5030 LOAD a file.
6000-6030 SAVE a file.

Variables

A = Search, delete loops.
L = Entry number.
A\$ = Menu List.
D\$ = Entry to be added to list.
E\$ = Entry to be erased.
LS (n,32) = List of n entries each of 32 characters.
Q\$ = Entry to be searched for.
Y\$ = File to be Saved/Loaded

```

2 REM *****
5 REM ** TELEPHONE DIRECTORY **
10 REM * @ D. HARRISON 1983 **
12 REM *****
20 BORDER 0: PAPER 0: INK 7: C
LS
30 POKE 23558,8
35 GO SUB 200
40 PRINT TAB 5;"TELEPHONE DIRE
CTORY": RESTORE
50 PRINT: PRINT
60 FOR A=1 TO 6: READ A$
70 PRINT AT A*3,6:A;AT A*3,9:A
$
80 NEXT A
90 DATA "ADD A NUMBER","DELETE
A NUMBER","SEARCH","EXIT PROGRA
M","LOAD A FILE","SAVE A FILE"
100 LET I$=INKEY$: IF I$="" THEN
N GO TO 100
110 IF I$<>"1" AND I$<>"2" AND
I$<>"3" AND I$<>"4" AND I$<>"5"
AND I$<>"6" THEN GO TO 100
120 LET GOTO=CODE I$-48
130 GO TO (GOTO+1000)
140 STOP
200 DIM L$(500,32)
    
```

```

210 LET L=1
220 DIM Z(100)
230 LET ZZ=1
999 RETURN
1000 CLS: PRINT TAB 5;"TELEPHON
E DIRECTORY";AT 2,0;"1. ADD A NU
MBER."
1010 PRINT: PRINT "PLEASE TYPE
IN THE ENTRY YOU WISH TO ADD
TO THE DIRECTORY AND THEN PRESS
ENTER."
1020 INPUT D$
1030 IF LEN D$>32 THEN PRINT AT
9,0;FLASH 1;"SORRY, YOUR ENTRY
IS TOO LONG. MAXIMUM LENGTH ALL
OWED IS 32 CHARACTERS."
": GO TO 1020
1040 PRINT AT 13,0;"IS THIS ALL
O.K. ?";AT 15,0;D$;AT 17,0;"IF N
OT, THEN PRESS 'N' AND YOU WILL
BE TRANSPORTED BACK TO THE MENU
PRESS 'Y' TO ADD THIS ENTR
Y TO YOUR DIRECTORY."
1050 IF INKEY$="" THEN GO TO 1050
1060 IF INKEY$<>"Y" AND INKEY$<>
"N" THEN GO TO 1050
    
```


ABACUS SOFTWARE-UK-LIMITED.

21 UNION STREET RAMSBOTTOM, Nr. BURY LANC.

DRAGON 32



MATHS TUTOR.

A SET OF PROGRAMS FOR TEACHING MATHS TO YOUNG CHILDREN (3-10 YEARS).

£5.00

EDUCATION

ARTIST £5.00
CREATES PICTURES, DESIGNS AND PATTERNS THAT CAN BE REPLICATED, PAINTED OR STORED AT THE TOUCH OF A BUTTON

METRICAL £5.00
A CONVERSION PROGRAM FOR METRIC UNITS

'O' LEVEL GEOGRAPHY £6.50
'WEATHER MAP SYMBOLS'
A TEACHING AID IN HIGH-RES. GRAPHICS THAT COVERS THE 'O' LEVEL SYLLABUS

TELL THE TIME £6.50
(IN ENGLISH, FRENCH OR GERMAN)
PROGRAM USES HIGH-RES. GRAPHICS AND SOUND TO TEACH CHILDREN HOW TO TELL THE TIME IN EITHER ENGLISH, FRENCH OR GERMAN.

MEASURING INSTRUMENTS £6.50
A TEACHING AID FOR 'O' LEVEL PHYSICS USING 100% HIGH-RES. GRAPHICS TO DEMONSTRATE THE USE OF MICROMETERS, VERNIER SCALES ETC.

FIRST LETTERS AND WORDS £6.50
A PROGRAM DESIGNED TO HELP CHILDREN FORM LETTERS AND USE THEM IN SIMPLE WORDS AND SENTENCES

MANY MORE PROGRAMS AVAILABLE.
SEND S.A.E. FOR DETAILS.



MUSIC TUTOR.

LEARN MUSIC WITH THIS COMPREHENSIVE PACKAGE THAT USES HIGH-RES. GRAPHICS AND ALL THE DRAGONS MUSIC FACILITIES. THE PACKAGE INCLUDES DEMO. PROGRAMS.

£9.95



THE WATERS OF LIFE

YOU ALONE CAN FIND THE WATER OF LIFE AND SAVE THE MIGHTY EMPIRE OF ONIN FROM THE EVIL FORCES.

£7.95



Splosh

JOIN THE MISSION AND DESTROY THE EVIL VIO SINCLAIR BEFORE HE DOMINATES THE MICRO MARKET.

£6.50

Tel, BOLTON 383839

GENEROUS DEALER DISCOUNTS



POOLSWINNER

THE ULTIMATE POOLS PREDICTION PROGRAM

PREDICTS Not just SCOREDRAWS, but NOSCORES, ALWAYS and HOMES

IT WORKS We guarantee the program performs significantly better than chance

ADAPTABLE "Poolswinner" allows the precise prediction formula to be set by the user — you can develop and test your own unique method. Probabilities are given on every fixture — choose as many or as few selections as you wish

EASY TO USE Fully menu driven, with detailed instruction booklet

DATABASE The program comes complete with the largest database available — over 20,000 matches. The database automatically updates as results come in

APPLE, BBC (B), COMMODORE 64, DRAGON, SPECTRUM (48K), ZX81 (16K)
£15 (all inclusive)

We produce databases for those developing their own prediction program. Two years results £7.50. Five years results £12.50

Available from dealers, or direct (return of post) from...

BARCLAYCARD
VISA

Selec Software



37 COUNCILLOR LANE, CHEADLE, CHESHIRE 061-428 7425
DEALER ENQUIRIES WELCOME

VIC20

32K SWITCHABLE TO
3K, 16K, 24K, BLOCK 5

£49.95 inc. VAT

16K SWITCHABLE TO 3K

£34.95 inc. VAT

16K STANDARD

£27.95 inc. VAT

All units guaranteed 2 years. Add £1 P&P
Overseas orders add £3 P&P

Telephone your Access or Visa card number for despatch by return post, or send your cheque/POs to:

RAM ELECTRONICS (FLEET) LTD

(DEPT. WM)

106 FLEET ROAD, FLEET, HANTS GU13 8PA

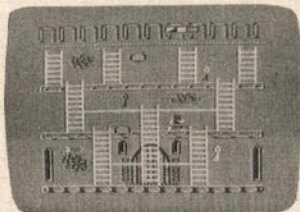
Telephone (02514) 5858

Callers welcome Monday to Saturday

Half-day Wednesday. Trade enquiries welcome

PRESENTING THE BEST GAME EVER
SEEN ON YOUR DRAGON 32

CASTLE ATTACK



**£6.50
INCLUSIVE**

AN EXCELLENTLY ANIMATED HIGH RESOLUTION ALL ACTION ARCADE STYLE GAME DESIGNED TO STRETCH YOUR MIND TO ITS ULTIMATE LIMIT. THE BEST EVIDENCE THAT COMPUTER GAMING HAS COME OF AGE FOR YOUR DRAGON 32. A SUPERB DEMONSTRATION OF DRAGON 32 SOFTWARE CAPABILITIES PUTTING OTHERS TO SHAME. A CLASSIC IN ITS OWN RIGHT. DON'T SEE ANOTHER COMPUTER GAME UNTIL YOU'VE SEEN CASTLE ATTACK. NO SOFTWARE COLLECTION SHOULD BE WITHOUT IT. AN EXCITING, FAST MOVING MACHINE CODE GAME YOU CANNOT AFFORD TO MISS. BUY IT.

FROM **M & D systems**

MAKE CHEQUES/PO PAYABLE TO M&D SYSTEMS
OF 24 MEADWAY, FRIMLEY, SURREY
NO JOYSTICKS REQUIRED.
DEALERS ENQUIRIES WELCOME.

OPEN FORUM

```

1070 IF INKEY$="N" THEN CLS : GO
TO 40
1080 IF INKEY$="Y" THEN LET L$(L
, TO LEN D$)=D$: LET L=L+1
1090 CLS : PRINT TAB 5;"TELEPHON
E DIRECTORY"
1100 PRINT : PRINT : PRINT "ENTR
Y SUCCESSFUL !!!";AT 8,0;"PRESS
ANY KEY TO CONTINUE."; PAUSE 0:
CLS : GO TO 40
2000 CLS : PRINT TAB 5;"TELEPHON
E DIRECTORY": PRINT
2010 PRINT "2. DELETE AN ENTRY"
2020 PRINT : PRINT : PRINT "TYPE
IN AS MUCH AS YOU KNOW OF THE
ENTRY WHICH YOU WISH TO ERAS
E."
2030 INPUT E$
2040 IF LEN E$>32 THEN PRINT AT
6,0; FLASH 1;"SORRY THIS IS TOO
LONG FOR THIS PARTICULAR DIRECTO
RY. PLEASE TRY AGAIN."
GO TO 2030
2050 CLS : PRINT TAB 5;"TELEPHON
E DIRECTORY": PRINT : PRINT
2060 FOR A=1 TO 500
2065 LET LEN1=LEN E$
2070 IF L$(A, TO LEN1)=E$ THEN P
RINT L$(A, TO LEN L$(A)): LET Z(
ZZ)=A
2080 NEXT A
2090 PRINT "END OF SCAN."
2100 PRINT : PRINT "DO YOU WISH
TO ERASE THESE ENTRIES?"
2110 PRINT : PRINT "TYPE 'Y' FOR
YES, 'N' FOR NO."
2120 IF INKEY$="" THEN GO TO 212
0
2130 IF INKEY$<>"Y" AND INKEY$<>
"N" THEN GO TO 2120
2140 IF INKEY$="N" THEN CLS : GO
TO 40
2142 PRINT : PRINT "DELETING "
2143 FOR A=1 TO 500
2145 IF L$(A, TO LEN1)=E$ THEN L
ET L$(A)=""
2150 NEXT A

```

```

2180 PRINT : PRINT "ENTRIES ERAS
ED.": PRINT : PRINT "PRESS 'ENTE
R' TO CONTINUE."
2190 INPUT K$: CLS : GO TO 40
3000 CLS : PRINT TAB 5;"TELEPHON
E DIRECTORY": PRINT : PRINT
3010 PRINT "3. SEARCH.": PRINT :
PRINT
3020 PRINT "INPUT THE ITEM YOU W
ISH TO SEARCH FOR."
3030 INPUT Q$: CLS
3040 LET W$=LEN Q$
3050 FOR A=1 TO 500
3055 LET F$=L$(A)
3060 IF F$(1 TO LEN Q$)=Q$ THEN P
RINT L$(A)
3070 NEXT A
3080 PRINT : PRINT "SCAN COMPLET
ED.": PRINT : PRINT "PRESS ANY K
EY TO CONTINUE.": PAUSE 0: CLS :
GO TO 40
4000 CLS : STOP
5000 CLS : PRINT TAB 5;"TELEPHON
E DIRECTORY": PRINT : PRINT
5005 PRINT "5. LOAD A FILE.": PR
INT : PRINT
5010 PRINT "PLEASE TYPE IN THE N
AME OF THE FILE WHICH YOU WISH
TO LOAD."
5020 INPUT Y$
5030 PRINT : PRINT : PRINT "STAR
T THE TAPE AND THEN PRESS ANY
KEY": PAUSE 0: LOAD Y$ DATA L$(1)
: CLS : GO TO 40
6000 CLS : PRINT TAB 5;"TELEPHON
E DIRECTORY": PRINT : PRINT "6.
SAVE A FILE.": PRINT : PRINT "PL
EASE TYPE IN THE NAME OF THE FI
LE."
6010 INPUT Y$
6020 SAVE Y$ DATA L$(1)
6030 CLS : GO TO 40

```

Telephone
by David Harrison

Cobwebs

on Dragon

This program will produce a series of

cobweb effects, going through the five
graphic modes on the Dragon.

Program notes

10-30 Prints the title.

40-50 Defines the mode and sets up the screen.
60 Starts loop for drawing cobwebs.
70-90 Checks how cobwebs are to be drawn.
100-150 Draws cobwebs.
160-170 Pause in program, clears screen.
180-190 Repeat until the loop is finished.

```

10 CLS:PRINT@203,"cobwebs"
20 FOR XX=1 TO 2000
30 NEXT XX
40 FOR S=0 TO 4
50 PMODES,1:PCLS:SCREEN1,1
60 FOR KK=4 TO 16 STEP 4
70 IF KK=12 OR KK=20 THEN 90 ELSE 80
80 FOR A=0 TO 255 STEP KK:GOTO100
90 FOR A=255 TO 0 STEP -KK
100 Y=FIX(A*191/255)
110 LINE(0,Y)-(A,191),PSET
120 LINE(A,191)-(255,191-Y),PSET
130 LINE(255,191-Y)-(255-A,0),PSET
140 LINE(255-A,0)-(0,Y),PSET
150 NEXT A
160 FOR D=1 TO 2000:NEXTD
170 PCLS
180 NEXT KK
190 NEXT S

```

Cobwebs
by J Blatch

RUNESOFT

presents

RUNESOFT



RUNEPACK 1

ORIC 1

RUNEPACK 1: by M R Chambers.
A collection of six programs for all the family for the 16/48K Oric 1.

- | | |
|------------------|---------------|
| 1. Codebreaker | 4. Hangman |
| 2. UXB | 5. Windmills |
| 3. Tick-Tack-Toe | 6. Biorhythms |
- Great Value at £6.95.

SPECTRUM 48K

SPECTREALM: by J A Slack.

Can you help Spectra survive 100 years under your government policies ... buy power stations ... factories ... fuel ... and food plus many more assets to help Spectra become a world super power. For one or two players, at only £6.95.

Send cheques/PO to:

Runesoft, Charnwood House, 67 Lower Parliament Street, Nottingham NG1 3BB

RUNESOFT



SPECTREALM

Both cassettes are beautifully packaged with gold blocked, black leather effect inlay cards and instruction leaflet.

available soon

DRAGONIA — Dragon 32
PARADOX — Spectrum 48K

Trade enquiries welcome.

Wizard Software

FOR DRAGON 32 ZX SPECTRUM 48K ORIC-1 48K



DRAGON STAR TREK **DRAGON 32** £8.45

A real time version featuring a 10×10 galaxy, shield control, photon torpedoes, status reports, signals received, galactic search, scanner control, warp drive, star bases with docking, black holes, planets and planet landfall, pulsars, novae, stars, asteroids, meteors, shuttles and shuttle docking, automatically converging and attacking Klingons. Four levels of difficulty, comes with instruction manual.

TIME PORT 1 **DRAGON 32** £8.45
ZX SPECTRUM 48K £6.95

The first in a series of five adult strategy adventure games. Direct your robot and acquire the object that the Keeper will ask for and bring it safely back to the Time Port.

EVICTOR **DRAGON 32 and ORIC-1 48K** £7.95
ZX SPECTRUM 48K £5.95

An original arcade game presented in high resolution graphics with machine code for extra zip. Evict the aliens from their self-regenerating and defended base. Features lasers, phasers and bombs. Five skill levels. Dragon 32 and Oric-1 versions feature a demonstration mode.

RECOMMENDED BY THE MICROCOMPUTER SOFTWARE CLUB

All prices inclusive. Mail order. Cheques or postal orders to:

**WIZARD SOFTWARE, DEPT. PCW, PO BOX 23
DUNFERMLINE, FIFE KY11 5RW**

Also available from software retailers in UK, Europe and Africa
Send large SAE (7in. x 5in.) for full program catalogue
Royalties paid for superior quality DRAGON 32 and ORIC-1 software

New from **SUNSHINE** Master your ZX Microdrive

programs, machine code and networking by Andrew Pennell

Master your ZX Microdrive contains all the information you will ever need to use the ZX Microdrive to the full. Clearly explained, with many examples, it is equally suitable for the relative newcomer to BASIC through to the experienced machine code programmer.

Andrew Pennell has also included a full database file handling program to let you put the ZX Microdrive to practical use with your Sinclair Spectrum.

Look out for the Sunshine range in W.H. Smith's, Boots, John Menzies, other leading retail chains and through our national network of book shops and specialist stores. Dealer Enquiries: 01-437 4343



ISBN 0 946408 19 X

Please send me

☐ Master your ZX Microdrive at £6.95 each

I enclose cheque/postal order for £..... made payable to: Sunshine Books: 12/13 Little Newport St., London WC2 3LD.
Or phone your order through on Access Mastercard 01-437 4343

Name _____

Address _____

Signature _____

We can normally deliver in 4/5 days.

SPECTRUM EXTENDED BASIC

—IMPROVE YOUR PROGRAMMING —EASE DE-BUGGING
—HELPS YOU ADD STRUCTURE TO YOUR PROGRAMS

The ten additional BASIC commands provided by Spectrum Extended Basic are considered an essential aid for most programming applications, so much so that many of these commands are standard features on other Basics.

The program is compact, occupying less than 5K memory, is user friendly—requiring only a two keyentry—and incorporates syntax checking.

The program commands are used and entered just like normal Basic keywords, the program operates bytrapping your usual keyboard input and testing for any of the ten additional commands.

The extra commands available are:

- AUTO auto line number, start and interval definable.
- CLOCK ON/OFF 12 hour clock, displayed on screen.
- DELETE Basic line/block delete.
- EXAMINE reads tape headers and displays information.
- FIND find specified string in Basic program.
- MEMORY displays memory status.
- RENUMBER full line renumber with GOSUBs and GOTOs
- SCROLL ON/OFF continuous scrolling.
- TRACE ON/OFF slows program execution, displays line and statement currently executed.
- VARIABLES displays variable names and contents.

48K Spectrum Extended Spectrum—£9.95

Also available at Boots, W.H. Smith and all good computer shops.

DELIVERY:

UK—prices include VAT and postage & packing.

EUROPE—add 80p per program

ALL OTHER PLACES—for air mail add £2 for the first program and 50p for each subsequent program. Surface delivery add 80p per program.

cp software

Send Cheque, Postal Order or Access No. to:
**CP SOFTWARE, Dept PCW1A
17 Orchard Lane, Prestwood,
Bucks HP16 0NN**



63

A QUALITY LIGHT PEN SUPERIOR PERFORMANCE

- ★ Absolutely insensitive to ambient lighting.
- ★ Responds to different colours and screen intensities without any adjustment of TV or monitor.
- ★ Red LED readout showing that data is available.

- ★ Switch for program control (allows pen to approach the screen without erroneous data capture)



- ★ All features are program accessible

SUPERIOR PROGRAMS

- ★ Good Documentation
- ★ Tape storage of your work
- ★ User routines provided on tape and printout
- ★ 'Freehand' drawing program
- ★ 'Library menu' drawing program (define your own library of shapes)
- ★ Example programs illustrating uses of the pen and its features

£25

inclusive of P&P etc.

Please state Dragon, BBC or Vic20 when ordering. Send cheque or P.O. to: Dept DU1, Datapen Microtechnology Ltd., Kingsclere Road, Overton, Hants.

Please enclose SAE if requesting technical literature. We welcome enquiries from dealers willing to demonstrate our product.

Datapen Microtechnology Limited



HEY YOU !!! SPECTRUM OWNER

DON'T MISS THESE



FARMER-16K/48K Arcade Game.
All machine code - Super graphics.
Progressive difficulty feature
Bonus scores - User tested.

A highly addictive game - How good are you at avoiding Fox Hunts, Bulls, Lorries, Tractors, Etc. ? Can you 'out Fox' the Dog & Hen to save the corn ?



ASSIGNMENT EAST BERLIN
48K Adventure Game.
Machine code search routines
for fast response, quick save
& auto verify (10 secs each).

Have you got what it takes to survive as a Spy in East Berlin ? You will be pursued by Police at every turn, will you complete your Mission ? Who is the Thin Man ? What secret does the Blonde Hostess hide ?

Both games user tested before release.
Both games £5.95 each inc post & package.

Link Enterprises, 20 Derwent St, Consett, Co. Durham.

Name. _____

Address. _____

Please rush me, by return of post, within 48Hrs. At £5.95 each :
Farmer. Assignment East Berlin. I enclose

Cheque / P.O. No. _____

Experience CDS programs yourself

This is 'Magic Meanies' a brand new Arcade game from CDS.

Just one of a new range of exciting programs....
Arcade action...
3D Space adventures
Education and pure fantasy....

ONLY £5.95 each at
W.H. Smiths, 'Boots,
John Menzies and other
leading Computer Stores, or...



Available direct from CDS Micro Systems
10, Westfield Close, Tickhill, Doncaster DN11 9LA.
Send Cheque or P.O. To CDS
Tel: (0302) 744129.

★ Selected titles only



ALPHA-NUM

(Spectrum 48K/Modified Version for 16K)

Nine-feature menu includes alphabetical and numerical sorting, indexing, review, update and copy (for printer). An invaluable aid for writers, teachers (register, marks, etc), Small traders and hobbyists of all kinds.

HOME INVESTOR

(Spectrum 16K/48K)

An essential program for the private investor. Menu driven program enables user to ascertain future value of investment; actual rate of growth; present values; period required to amass specific sum; mortgage and annuity calculations; flat and redemption yields; net of tax returns... and still more!

EACH £4.95 — BOTH FOR £8.95 (POST FREE)

ORIGINAL SPECTRUM UTILITIES AT REDUCED PRICES

ZXed Toolkit (DK Tronics) £5.00. Compiler (Wye Valley) £6.50. 64 Print/Master Define (Ahmed) £3.50. Kopycat (Med Soft) £3.00. ZX Toolkit (Star Dreams) £5.00

R. G. WINFIELD BSc (Econ) FIB

Dept 1, 7 Gore Lane, Rayne, Essex CM7 8RL

C.C.S. LTD.

SAFFRON

SOFTWARE

URGENTLY REQUIRE

**GAMES PROGRAMS OF THE HIGHEST QUALITY
FOR THE SPECTRUM, ORIC, VIC20, COMM 64, BBC**
Cash payments or royalties

Send your masterpiece, in the strictest confidence to:
**C.C.S. Ltd, Saffron, 174a High Street,
Hornchurch, Essex RM12 6QP. Tel: (04024) 75613.**

PROGRAMMERS!!

Are you hell bent for recognition? Then contact Saffron

OPEN FORUM

Dual

on BBC

Dual is a program for two players. It should

work on either A or B. The idea of the game is to destroy your partner ten times as you move left and right.

Program notes
10 - 160 Instructions

170 - 260 Initialise all variables
270 - 360 Defined characters
370 - 510 Print score and cowboys
520 - 600 Input and move cowboys
610 - 640 Prevents move off screen
650 - 920 Moves bullets
930 - 1030 Would you like another game?

```

10 MODE 7
20 CLS
30 PRINT"          DUAL"
40 PRINT"          ****"
50 PRINT" TSCORE=THE TOP MANS SCORE."
60 PRINT" BSCORE=THE BOTTOM MANS SCORE."
70 PRINT
80 PRINT" THE IDEA OF THE GAME IS TO
  DESTROY YOUR OPPONENT BY HITTING HIM
  TEN TIMES."
90 PRINT
100 PRINT"KEYS:"
110 PRINT"TOP MAN= Z=LEFT  X=RIGHT
  A=FIRE"
120 PRINT"BOTTOM MAN= ,=LEFT  .=RIGHT
  ;=FIRE"
130 PRINT
140 PRINT"          (HIT A KEY TO BEGIN)"
150 B$=GET$
160 IF B$="" THEN GOTO 160
170 SC=0: S=0
180 CLS
190 COLOUR 131
200 MODE 2
210 X=5
220 Y=1
230 Z=10
240 C=28
250 COLOUR 131
260 CLS
270 VDU 23,248,0,0,60,60,255,255,255,255
280 VDU 23,249,60,60,60,60,60,60,60,60
290 VDU 23,240,56,254,124,146,238,254,
  198,124
300 VDU 23,241,56,124,186,186,186,84,
  56,56
310 VDU 23,242,40,40,40,40,40,40,108,0
320 VDU 23,243,56,254,124,146,238,
  254,198,124
330 VDU 23,244,56,124,186,186,186,
  84,56,56
340 VDU 23,245,40,40,40,40,40,40,108,0
350 VDU 23,250,24,24,24,219,219,219,
  255,255
360 VDU 23,251,24,24,24,24,60,126,0,0
370 COLOUR 2
380 PRINTTAB(0,0); "TSCORE:"; S
390 PRINTTAB(11,0); "BSCORE:"; SC
400 COLOUR 1
410 PRINTTAB(X,Y); " "; CHR$240; " "
420 PRINTTAB(X,Y+1); " "; CHR$241; " "
430 PRINTTAB(X,Y+2); " "; CHR$242; " "
440 PRINTTAB(Z,C-2); " "; CHR$243; " "
450 PRINTTAB(Z,C-1); " "; CHR$244; " "
460 PRINTTAB(Z,C); " "; CHR$245; " "
470 COLOUR 2
480 PRINTTAB(3,15); CHR$250
490 PRINTTAB(3,16); CHR$251

```

```

500 PRINTTAB(14,17); CHR$250
510 PRINTTAB(14,18); CHR$251
520 A$=GET$
530 PRINTTAB(0,0); "TSCORE:"; S
540 PRINTTAB(11,0); "BSCORE:"; SC
550 IFA$="Z" THEN X=X-1: GOTO 610
560 IFA$="X" THEN X=X+1: GOTO 610
570 IFA$=";" THEN GOTO 690
580 IFA$="." THEN Z=Z+1: GOTO 650
590 IFA$="," THEN Z=Z-1: GOTO 650
600 IFA$="A" THEN GOTO 760
610 IF X=0 THEN X=X+1
620 IF X=19 THEN X=X-1
630 COLOUR 1
640 GOTO 410
650 IF Z=0 THEN Z=Z+1
660 IF Z=19 THEN Z=Z-1
670 COLOUR 1
680 GOTO 410
690 FORT=26 TO STEP-1
700 PRINTTAB(Z+1,T-2); "."
710 FOR DELAY=1 TO 10: NEXT DELAY
720 PRINTTAB(Z+1,T-1); " "
730 NEXT T
740 IF X=Z AND A$=";" THEN GOTO 830
750 GOTO 410
760 FOR P=4 TO 27
770 PRINTTAB(X+1,P); "."
780 FOR DELAY=1 TO 10: NEXT DELAY
790 PRINTTAB(X+1,P); " "
800 NEXT P
810 IF Z=X AND A$="A" THEN GOTO 880
820 GOTO 410
830 PRINTTAB(X+1,Y); CHR$248
840 PRINTTAB(X+1,Y+1); CHR$249
850 SC=SC+1: IF SC=10 THEN GOTO 930
860 FORT=1 TO 2000: NEXT T
870 GOTO 290
880 PRINTTAB(Z+1,C-1); CHR$248
890 PRINTTAB(Z+1,C); CHR$249
900 S=S+1: IF S=10 THEN 930
910 FORT=1 TO 2000: NEXT T
920 GOTO 290
930 CLS
940 MODE 7
950 PRINT"          WELL DONE!"
960 PRINT"          *****"
970 PRINT" YOU SHOT YOUR OPPONENT
  TO PIECES"
980 PRINT" WOULD YOU LIKE ANOTHER
  GAME Y/N?"
990 C$=GET$
1000 IFC$="Y" THEN GOTO 20 ELSE GOTO 1010
1010 CLS
1020 PRINT"BYE-BYE HOT SHOT!"
1030 END

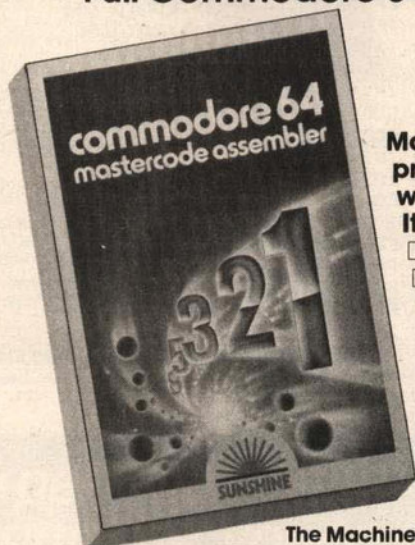
```

Dual
by Martin Rushton



Mastercode Assembler for the Commodore 64

Full Commodore 64 Assembler/Disassembler



£14.95
inc VAT

Mastercode is a substantial and complex program of use to anyone interested in writing machine code on the Commodore 64. Its features include:

- ☐ Machinecode monitor
- ☐ File Editor
- ☐ Disassembler
- ☐ Assembler

Mastercode is a full two pass assembler. It accepts labels, variables and equations within assembly language programs. It is possible to store programs anywhere in memory, even in parts occupied by the Assembler. Programs can be saved to either tape or disc.

The Machine Code Monitor includes:

- OUTPUT OF MEMORY TO SCREEN OR PRINTER
- MODIFICATION OF MEMORY
- EXECUTION OF MACHINE CODE PROGRAMS
- SAVING OF MACHINE CODE FILES ON TO TAPE OR DISC
- LOADING OF MACHINE CODE FILES FROM TAPE OR DISC
- STEP BY STEP TRACING OF THE EXECUTION OF A MACHINE CODE PROGRAM, INCLUDING DISPLAY OF REGISTER CONTENTS.

The Disassembler will translate into assembly language the contents of any area of memory, whether the 64's ROM or a user program. Output may be sent either to the screen or a printer.

The File Editor includes:

- ENTRY OF NUMBERED LINES OF ASSEMBLY LANGUAGE INSTRUCTIONS
- LISTING, INDIVIDUALLY OR IN BLOCKS, OF PREVIOUSLY ENTERED LINES
- DELETION, INDIVIDUALLY OR IN BLOCKS, OF EXISTING LINES
- RENUMBERING OF EXISTING LINES
- SAVING OF ASSEMBLY LANGUAGE FILES TO TAPE OR DISC
- LOADING OF ASSEMBLY LANGUAGE FILES FROM TAPE OR DISC
- ADDITION OF A BLOCK OF MEMORY SPECIFIED BY THE USER TO THE USER'S ASSEMBLY PROGRAM

The Assembler allows the translation of assembly language programs into machine code with full error checking, labelling and a range of assembler directives.

LOOK OUT FOR THE SUNSHINE RANGE IN
W.H. SMITH'S, BOOTS, JOHN MENZIES,
OTHER LEADING RETAIL CHAINS AND
THROUGH OUR NATIONAL NETWORK OF
BOOK SHOPS AND SPECIALIST STORES.

Please send me Commodore 64 Mastercode Assembler
@ £14.95 inc VAT. I enclose cheque/postal order for £_____ made
payable to Sunshine: 12/13 Little Newport Street, London WC2R 3LD.
Or telephone your order through Access/Mastercard on 01-437 4343

Name _____

Address _____

Signature _____

Averages

on Spectrum

The program is called "averages" and I use it to work out mean and modal averages. It is written for the ZX Spectrum (either model) but should prove easy to convert to run on most other Basics. At the

start of the program you will be asked how many numbers you wish to compare. Next you type in those numbers (entering each number in turn using *Enter*). Finally the computer will print a list of the numbers entered followed by the modal average (if there is one), the number of times it appears and the mean average. The option for a printout is included.

Program notes

- 100-200 Allows for the inputting of numbers and sets up the variables.
- 210-250 Compares numbers inputted to see if any are the same.
- 260-290 Finds mode (greatest value of d).
- 300-370 Prints numbers, mode and the number of times that the mode appears.
- 380-420 Works out and prints mean.
- 425-470 Options available.
- 500-590 Printout.

```

100 REM AVERAGES BY SIMON SMITH
1010 BORDER 0: PAPER 0: INK 7: C
LS
120 INPUT #0:"How many numbers
in calculation (Type number then
Press ENTER) T:";T
125 IF T=1 THEN GO TO 120
130 DIM A(T)
140 FOR N=1 TO T
150 INPUT A(N)
160 NEXT N
170 DIM C(A+1)
180 FOR N=1 TO A+1
190 LET C(N)=0
200 NEXT N
210 FOR M=1 TO A
220 FOR N=1 TO A
230 IF A(M)=A(N) THEN LET C(M)=
C(M)+1
240 NEXT N
250 NEXT M
260 LET D=C(1)
270 FOR N=1 TO A
280 IF C(N)>D THEN LET D=C(N):
LET Mode=A(N)
281 IF C(N)=D THEN LET D=1
290 NEXT N
300 PRINT "The numbers inputted
were.....": PRINT
310 FOR N=1 TO A
320 PRINT A(N)
330 NEXT N
340 PRINT: PRINT
350 IF D=1 THEN PRINT "There is
no single mode": GO TO 360
365 PRINT "The mode is ";mode

```

```

370 PRINT "It appears ";d;" tim
es"
380 LET total=0
390 FOR N=1 TO A
400 LET total=total+A(N)
410 NEXT N
420 PRINT: PRINT: PRINT "The
mean is ";total/A
425 PRINT #0:"HIT ANY KEY TO CO
NTINUE": PAUSE 0
430 INPUT "Press y-for a printo
ut of this screen r-to input ne
w numbers e-to exit the progra
m. Then press ENTER ";a$
450 IF a$="y" THEN GO SUB 500:
GO TO 430
460 IF a$="e" THEN STOP
470 IF a$="r" THEN GO TO 100
480 GO TO 430
500 LPRINT "The numbers inputte
d were.....": PRINT: PRINT
510 FOR N=1 TO A
520 LPRINT A(N)
530 NEXT N
540 LPRINT: LPRINT
550 IF D=1 THEN LPRINT "There i
s no single mode": GO TO 560
560 LPRINT "The mode is ";mode
570 LPRINT "It appears ";d;" ti
mes"
580 LPRINT: LPRINT: LPRINT "T
he mean is ";total/A
590 RETURN

```

Averages

by Simon Smith

Microradio

GW6JJN



Broadcasting

This week I would like to mention another kind of radio, the broadcast radio. The BBC and IBA to be exact. Microradio has so far only dealt with the amateur and CB kind radio, but you can't keep a good thing down and the big boys are getting into the act.

Radio West in the Bristol area now has an extremely large audience for their *Data-rama* programme. They transmit a microshow which discusses aspects of computing and then, late at night when only the computer freaks are about, they transmit computer

programmes (the kind you Load). This ghastly noise can be heard in the small hours on the FM and medium wave bands for Spectrum and BBC computers. All that is needed is the trusty radio cassette recorder and there are programs to be had for free. I must add that the disc jockeys do not talk over the intro as they do on pop records much to the frustration of some.

The word is spreading and now Radio Victory is at it. They are sending *Screens* over the air with their logo and that of a certain software company not a million miles from Portsmouth; shades of Pimania no less.

As if this was not enough, BBC Radio Wales is the latest candidate vying for the poor micros time. On Fridays at 6.30 pm they have their own computer programme and will be transmitting the *Loading*

kind as well. These will be in Basic for most microcomputers (and, I expect, Welsh for the Dragon). Radio Wales transmits its broadcasts and funny noises on 882Khz in the medium wave.

All of this has been too much for me, I don't get enough sleep as it is. There is a rumour that I have been seen coming and going about the studios of Swansea Sound Radio. I have always had a hankering to be a floppy disc jockey, so who knows, but that's another story.

A quick word for all those lucky people who live in the Duchy of Cornwall. The Cornish Amateur Radio Club now has a computer section devoted to the likes of us. I attended one of these meetings a while ago and was very impressed. Radio computing is becoming very popular down in the southwest where most

people have BBC micros, as I understand. Local listeners who cannot understand conversations on the amateur bands emanating from the Cornwall area can now be told that *The Philosophers Quest* has been solved and the region is back to normal.

One point: please note that information about the Cornish Club can be obtained from Simon Rodda on Penzance 3948. A second point is that when writing to the addresses I give in this column, a stamped addressed envelope will always bring a reply. It is common courtesy, after all.

Ray Berry GW6JJN

This series of articles is designed for radio and microcomputer enthusiasts alike. If you have any queries that you want answered, hints and tips to share, or topics that you would like to see covered, write to: Ray Berry, Microradio, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

THE DAN DIAMOND TRILOGY

My name is Diamond, Dan Diamond, and this is my story. A story of beautiful mermaids, bored robots and dank, dark dungeons. A story that started one muggy day in New York, and like the Big Apple, it's rotten to the core.

The Dan Diamond Trilogy is three separate adventure games. Each game may be played on its own, but clues may be found in the earlier adventures which may help later on. Each game comes with a lavishly illustrated 20-page case file, and hints (both helpful and misleading) which have been hidden in the illustrations.

Part I. Franklin's Tomb, in which our hero receives a mysterious plea for help which leads him to a hidden tomb and the mystery of the stargate.

Part II. Lost in Space, in which our hero finds himself stranded on a derelict spacecraft, doomed to travel endlessly through space, or find a way out.

Part III. Fishy Business, in which our hero lands on a watery planet, discovers the source of the plea for help and saves the day.

All three programs cost £9.95 each and are available for the DRAGON 32, BBC MODEL B and 48k ORIC-1 microcomputers. (note: Fishy Business for the BBC and ORIC will be available February 1984).

Cheques or postal orders payable to:

Salamander

SOFTWARE

17 Norfolk Road, Brighton, East Sussex, BN1 3AA.

Look out for Dan Diamond's next Adventure Series "Franklin in Wonderland" Available Spring 1984

It must be the most consistently enjoyable adventure game I've ever played
— Computer Choice
(Program of the Month) —

Tony Bridge's Adventure Corner



Number one

I have a letter this week from Blair McGlashan of Swanley in Kent. He has a few tips for you to try out while playing *The Hobbit*.

"You may have noticed," he writes, "how the rope may be used for getting the torches in the goblin's cavern, and the elvenking's hall, by tying the torch and then taking the rope. You now carry the rope, with the torch tied to it."

Another anomaly that Blair has noticed is that the barrel can be used to carry objects that would otherwise be too heavy to carry. Now, says Blair, the player is able to use this in order to take any object that is mentioned in the program's description of each location. Thus, should you wish, for some strange reason, to collect the curtain at Beorn's House, go about it this way:

TIE CURTAIN
OPEN BARREL (you will, of course, have to have the Barrel)
PUT ROPE IN BARREL (ditto the rope!)
EMPTY BARREL
UNTIE ROPE

Now, if you ask the computer for an inventory, you should find that you are carrying the curtain. This can be repeated for any inanimate object present at any of the locations, the only stumbling-block being that only that object may be carried.

Blair also throws some light on the "Barrelbug" that many of us have noticed — the one that causes the program to crash, or freeze, when you try to climb into the barrel. He points out that in order to climb into the barrel, the adventurer will probably have taken it beforehand. And you cannot, logically, be in something if you are also carrying it — so the computer locks up.

Finally, while talking of barrels, Blair says: "We see so much today about graphic adventures — and I would argue that this trend has been largely instigated by *The Hobbit*. Some of the serious adventurers among us wonder whether this is a good thing? When I first bought *The Hobbit*, I was impressed by the very good graphics, but the novelty soon wears off and the pictures begin to spoil the game by ruining one's own conceptions, which can be exceptionally vivid. I remember reading that each picture takes up approximately 500 bytes and there are at least 20

pictures. In this 10K of space, *The Hobbit* could have had many more locations, such as the eagles' eyrie, and characters."

I'm in two minds about this subject — I love the pictures of *The Hobbit* and, as they are based on Tolkien's original illustrations, they are from the horse's mouth! However, it does get a bit annoying when, for the thousandth time, the goblin's dungeon is S-L-O-W-L-Y drawn. The Mysterious Adventures from Channel 8 (which I can recommend as good text adventures) contain superb Hobbit-like graphics. But, at a key-press, they can be turned off until called back. In fact, in order to see what objects are at the location, the picture has to be wiped from the screen, which will then reveal the information.

I don't know if *The Hobbit*, beloved though it is of us adventurers in the UK, "largely instigated" the current vogue for graphics in text adventures. After all, the Spectrum, let alone *The Hobbit*, has made little impression in the States so far.

From Southern Lapland, Gunnar Thander writes: "I am glad to say that the first adventure I bought was *The Hobbit*. This definitely made me mad (a micro-adventurer). Have you ever thought about the importance of trying a good, and I mean good, adventure the first time. I think 'old' adventurers really should try to show 'beginners' the good adventures."

We, the Grand Elf and I, try our best in this column, Gunnar, to bring you up to date with new adventures, and also (and very importantly), to retain interest in the old favourites... and don't forget to keep an eye on the *New Releases* spot, where Graham Taylor will advise you on the latest programs.

Gunnar continues: "Being non-English, every time I begin a new adventure, I actually face two adventures. The first is the program itself, the second one is the English language!"

Gunnar and his two sons have finally completed *The Hobbit*. If the Thander household is feeling a bit lost and wondering what to try now, there is *Valhalla* awaiting them. As I write, this program is number one in the software best-seller charts and Legend, its authors, claim that the adventure will have done one million pounds worth of business by Christmas, which is very well deserved. I'll be looking in more detail at this program later, but for now, it is gratifying to see that this stunning adventure is getting recognition.

While on this subject, let me move on to a letter I have received from George Wells, of Raynes Park in London. George is 69 (which must make him eligible for a senior adventurer award!). He rescued a Spectrum from his daughter, who was about to throw the thing out of a window. George doesn't say which adventure she was playing, but he has now given it a diet of *Valhalla* which it seems to like very much: "I never cease to admire and wonder at the programmer's skill... I also play *The Hobbit*, but, for me, it cannot hold a candle against *Valhalla*. Like the Grand Elf, and

Graham (New Releases) Taylor, George has noticed that the program has a unique reaction to the casual swear-word! He finishes: "At 69 I must be in my second childhood. I once started *Valhalla* at 11.30 am and finished at 1 am the following morning." I hope you have many more happy hours with this wonderful adventure, George!

The Hobbit Hall of Fame

Steve Redhead (I do mention *Golden Apple*, Steve, and I agree, it is very good), Wayne Greaves, Kevin Marsh and Peter Bywater, who says that he managed it despite not being one of those unfortunates who can go round *Manic Miner* 20 times before the program has loaded, or thrash the life out of *Orbiter* with the telly off! I know how you feel, Peter — even after reading all the letters in *Popular Computing Weekly* about how to beat *Manic Miner* and the others (what is the point, then, of playing them, I wonder), I still can't get past Eugene!

Incidentally, Peter, your observations about the various objects such as the golden key, the curious map and so on, are a little off target. You'll find the adventure harder to complete without them.

J Pearson with 92.5 per cent (and, no you are certainly not the only one to have bought *Valhalla*), Mike Docherty, Alan and Daphne Davis, Daniel Pitcher, Stuart Wedgwood (who has also scored a magnificent 400 points in Crystal's fantastic *Halls of the Things*) and finally Jason Turtle who has completed *The Hobbit* in four moves!

To finish this week, a couple of pleas for help in Acornsoft's *Castle of Riddles*. Mark Richards, with a grand score of four, would like to know how to progress past the wishing well, having met the bear, seen the mirror, and the blood-sucking creature. Also, what does G.L.O.O.P. mean? Are these the letters on the wall of the corridor of doom, Mark? If so, try going *Up* from the courtyard, standing in front of the safe, and *Saying* the word. You could also try getting the bucket from the well (and persevere, it may not come up the first time).

Andrew Goodall is also stuck in *Castle of Riddles*, at the top of the pinnacle after the shooting gallery. Is there a magic word, or does he need a rope? He is also stuck in Digital Fantasia's *Time Machine* — how can he get out of the secret room underneath the desert?

In the near future I hope to be looking at some very interesting adventures that come, like *The Hobbit*, complete with novels.

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to: Tony Bridge, Adventure Corner, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

DRAGON 32

MRC

Air combat and ground strike. "joystick" controlled sights cannon fire and bomb release. Full colour, Hi-res graphics, 3D and sound.

£6.50

Fruit

Compulsive, addictive, fruit machine. Using your skill with the holds, turn your £5 stake into £10 and beat the system. Hi-res graphics and sound. £4.95

Look and Learn

Educational picture recognition. Hi-res graphics, text and colour. Age 3-10yrs. £4.95

Pontoon

Super Hi-res graphics, full colour definition and card display. Fascinating, absorbing. £4.95

Missile Command

City defence from attacking missiles, progressively difficult. Arcade type, joystick. £4.95

Graphics Demonstrator

3D rotation, drawing with joystick, approx. 50 examples of Dragon's impressive graphics. £4.95

ORIC 1

Flight Simulator

With airspeed, radar, ground/vertical flight path indicators, artificial horizon and altimeter with continuous flight monitor on engine condition, stall speed etc., full colour, Hi-res graphics, 3D and sound. £6.95

Moonster

Defeat the guardians of Hyper to retrieve the life crystal. Mean zapo firing gremlins have orders to blast you on sight. Progressively difficult. Arcade type original. £6.95

Quark 3D Invaders

Superb update of original arcade game, pushes oric to its limits. Full colour and sound. £6.95.

Super Fruit

Excellent graphics and definition fruit machine. Full colour and sound, holds etc. £6.95

Tango Foxtrot 01

Using your skill, locate the airstrip with the radar scanner, fly your aircraft through hazardous crosswinds and air pockets to land safely. Watch your fuel, watch your artificial horizon, be sure you are level on final approach. Full colour, Hi-res graphics, 3D and sound. £6.50



SPACE CRYSTAL

Space Crystal

Space trading adventure game. Fascinating 3D space travel on your voyage for the Illudium crystal. Black holes, hyper-drive, gamble planets and space pirates. Full colour and sound. £6.95

FOR

COMMODORE 64K DRAGON 32K ORIC 48K AND SPECTRUM 48K

QUARK DATA P.O. BOX 61, Swindon, Wilts. Tel. (0793) 40661.

Please supply

Prices incl. p&p. UK only.

Cheque for total amount enclosed

Name

Address



Home
Computer
Centre



29 Millcroft, Crosby, Liverpool L23 9XJ

Tel: 051-727 8050

Special
Offer

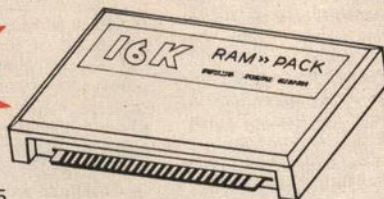
- VIC 20 16K STANDARD RAM PACK — £27.95
- VIC 20 16K SWITCHABLE RAM PACK — £35.95
- VIC 20 32K SWITCHABLE RAM PACK — £49.95

ALL RAM PACKS CARRY 12 MONTHS GUARANTEE

- VIC 20 4 SLOT SWITCHABLE MOTHERBOARD — £28.95
- CBM 64 4 SLOT SWITCHABLE MOTHERBOARD — £29.95

ASTERFRET TRADING LTD. INCORPORATES HOME COMPUTER CENTRE.

VIC 20 and CBM 64 are reg'd trade marks
Commodore Business Machines



16K STANDARD
£27.95

Please allow up to 21 days for delivery.
All prices include V.A.T., postage and packing.

If you wish to be added to our mailing list,
please tick the appropriate box

PLEASE SEND ME

Qty

- | | | |
|---------------------------------|---------------------------------------|--|
| <input type="checkbox"/> VIC 20 | <input type="checkbox"/> Dragon 32 | <input type="checkbox"/> 16K Std. Ram Pack |
| <input type="checkbox"/> CMB 64 | <input type="checkbox"/> TI99/4 | <input type="checkbox"/> 16K Switchable Ram Pack |
| <input type="checkbox"/> BBC | <input type="checkbox"/> ZX Spectrum | <input type="checkbox"/> 32K Switchable Ram Pack |
| <input type="checkbox"/> Lynx | <input type="checkbox"/> Electron | <input type="checkbox"/> VIC 20 4 Slot Motherboard |
| <input type="checkbox"/> Oric | <input type="checkbox"/> Colour Genie | <input type="checkbox"/> CBM 64 4 Slot Motherboard |

Name _____
Address _____

I enclose Cheque/PO for £ _____

Home
Computer
Centre



PCW



LIGHT CONTROL

B A Cummins of Clonmacnoise Road, Crumlin, Dublin, writes:

Q I own a Vic20 and would like to control lights, etc, through it. How is this done and is there a book on the subject?

A This can be done, but you will need a relay of some sort. The Vic will not have enough power to drive a mains relay directly, which means that you will have to use a transistor-driven relay to cope with the low voltage. If you want to use a static relay from the mains, then you will have to take care to isolate the extra mains power supply that would be needed.

As far as I know, there are only two books on the subject, *20 Simple Electronic Projects for the ZX81, Spectrum and other Computers* by Stephen Adams, which is heavily orientated to the Sinclair computers, but it carries a lot of useful general information, and *Simple Interfacing Projects* by Owen Bishop, which is more comprehensive and is not tied to a particular computer, but is more difficult to understand.

ASCII AND ANSI

Ian Carleton of St Leonards Hill, Windsor, writes:

Q I am new to computing and am getting my first computer for Christmas (an Acorn Electron). What is the difference between Ascii and Ansi? Does the Electron have them and does it need them?

I do not know if you have answered this before, but I

have seen the words a lot and would like to know because they seem important.

A The Electron has Ascii but not Ansi. Ascii stands for *American Standard Code for Information Interchange*. It is an agreed way of coding the main characters that a computer uses. Thus, a capital letter A has a code of 65 whether it is used on an Electron, Commodore 64, Spectrum, or any of the other common computers.

Although most computers augment the standard by adding their own characters to other code numbers, the main numbers and symbols remain the same. This is very important when it comes to enabling two computers to talk to each other.

Ansi is slightly different. It stands for *American National Standards Institute* and is a dialect of Basic. The Electron does not use this dialect, instead it uses a similar one to the common Microsoft Basic. Microsoft is used on the Commodore, Dragon and Oric, to name but a few.

DEDICATED UNIT

H Jenkins of Salford writes:

Q What is the difference between a monitor and a television?

A Essentially, the difference is that one is a dedicated unit and the other is not. A television was not made specifically to receive a signal from a computer — therefore, it contains a lot of circuitry for the decoding and presenting of pictures that have been transmitted over the air. Thus, any signal going into the set via the aerial socket is processed electronically and decoded before it comes on to the screen. All very necessary for a broadcast signal, but equally unnecessary for the signal produced by a computer.

The modulator has to turn the video output from the computer into UHF, so that it can be sent into the television, via the aerial socket. All this electronic manipulation of the signal, causes interference, resulting in a loss of clarity.

A monitor does not have any of the circuitry for decoding television signals. As long as the computer has the cor-

rect output, usually RGB (Red Green Blue) or composite video, then the monitor will accept this. With less electronic processing, there is a clearer signal.

BLACK AND GREEN

Lee Millset of Paradie Street, Warwick, writes:

Q I have recently purchased a Vic. It suits my needs very well, except when using the colour black in large blocks or as a screen border colour. In the case of large blocks, the screen distorts in the middle. When using black as a screen colour, the tv flickers uncontrollably and even fiddling with the tuning does not help. I have to turn off the computer to restore the picture.

Could you tell me it is a computer fault? It works perfectly with a mono set.

B P Knox of Garden Way, Littleborough, Lancs, also writes:

I own a Vic20, unexpanded, and it is faulty (I used another Vic to check). When using a black border I lose all green characters, which turn white, while cyan and yellow go pale. Can you tell me what is causing this?

I have been on to Commodore and they say they have not heard of the problem before.

A I have met this problem before, though I have never tackled it. I am surprised that Commodore have never met it at all. I have not got a definite answer, but one possible solution was offered to me by Stephen Adams.

Most probably, the problem lies in the Vic (Video Interface Chip), or the associated discreet circuitry. The phasing for the colour green is also the reference phasing for the other colours, so while a different phase means a different colour, it is green from which they take their standard. In addition, black is in fact off — no signal. Therefore, if you

are using black and green, you are in effect just switching the colour on and off.

If you have tried retuning your television and failed, then it is probable that there is a small problem in the video circuitry. Usually this would cause no trouble, but when black and green, which are constantly switching the screen display on and off, are used together, then this might well serve to exacerbate any faults.

In Lee's case it would seem as if the problem is that the Vic chip needs to action the Restart because it is going off phase. This happens when you power up. I am afraid that I can offer little help in fault finding, particularly if the problem comes from within the Vic chip itself.

I am afraid that all I can say is return your computer if it is still under guarantee.

WHAT IS A RADIAN?

David Grennell of Banbury, Oxfordshire, writes:

Q I have a Spectrum, but the question I want to ask is not about the Spectrum in particular. I would like to know what a radian is. Never a whizz at maths, I do, however, know a little bit about geometry, but I am sure I never met radians.

Could you explain — is it a set number of degrees or is it a fraction of pi?

A Radians can be expressed in terms of pi, but this is not the way a radian is established. There is a clue in the name, radian and the source, radius. In formal terms, a radian is 'the angle subtended at the middle of the circle, by an arc the length of a radius of that circle'.

Imagine a circle of two centimetres, draw the radius. From where it reaches the edge of the circle draw an arc the length of the radius, in this case 2cm. From there draw a second radius. The angle made by these two is one radian.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem Peek it to Ian Beardsmore and every week he will Poke back as many answers as he can. The address is Peek & Poke, PCW, 12-13 Little Newport Street, London WC2R 3LD.

VIDEO GALAXY

FOR THE BEST SOFTWARE
OVER 750 PROGRAMS IN STOCK
OVER 100 BOOKS IN STOCK
PLUS OTHER ACCESSORIES

SPECIAL OFFER . . .

DRAGON 32 £159.95

VIDEO GALAXY
293 CHISWICK HIGH ROAD
LONDON W4 4HH

POPULAR COMPUTING WEEKLY NEEDS HELP

Is there anyone out there with Dbase II on a Sirius?

We are looking for someone to write some DBase II routines to help with the administration of *Popular Computing Weekly*. Our own machines are used constantly so you must be able to follow a brief and work on your own.

If you are interested in the work, and money, call Duncan Scot, Popular Computing Weekly, on 01-437 4343.

ASTROLOGY

Wide range of Self-teaching and Accurate Calculation Programs for many machines including:

48K Spectrum, BBC, Commodore 64
Dragon, 16K ZX81, Sharp MZ80A
NewBrain, Tandy, Genie, PET

Please send large SAE to:

ASTROCALC

67 Peascroft Road, Hemel Hempstead
Herts HP3 8ER. Tel: 0442 51809

NEW GAMES FROM ALGRAY, GRAND MASTERS OF SPECTRUM

THE EXTERMINATOR 16K/48K . . . £5.50 (inc VAT, P&P)
A 2-stage machine code, fast action arcade style game. 1 — first kill the birds (if you can); 2 — then collect the eggs — the two robot guards are very quick!!!

TERRY'S TRAVELS 48K . . . £5.50 (inc VAT, P&P)
A 4-stage machine code, fast action arcade style game. Terry the Terrapin's task is to cross busy roads and fast-flowing rivers and then escape the maze. However, the four Terrapin Catchers in the maze wish to take Terry to the pie factory. CAN YOU HELP??

AHED HOUSE

DEWSBURY ROAD, OSSETT, W. YORKS
Also games for Dragon 32. Dealer Enquiries welcome.

THE



RUN

..... IS COMING

**ZX81, SPECTRUM, DRAGON
BBC AND VIC**

SOFTWARE LENDING LIBRARY

We have for hire from 50p (including postage) programs for your computer.

£5 for life membership (less than the cost of a single game) brings you the Software Lending Library membership kit including catalogue, newsletter.

All tapes lent with full manufacturer's permission.

Send a cheque or postal order for £5 to **Software Lending Library**, PO Box 3, Castleford, West Yorks, stating name, address, and computer type.

NOW!! DELTAS FOR DRAGONS



The smooth control of a Voltmace DELTA sprung 'return' joystick is now available to Dragon owners. Called the DELTA 3D it is a cut down version of our DELTA 14B handset. The same robust ball and socket jointed joystick but with the keypad blanked off to leave a choice of one of three fire buttons.

DELTA 3D joystick..... £10.00 each
or £19.50 per pair

Seven-day money back guarantee if not satisfied
Price includes p&p and VAT

VOLTMACE LTD, PARK DRIVE, BALDOCK, HERTS
TEL: 0462 894410

Made in England. Callers welcome
at the factory — Monday to Friday.
Trade terms available.



DATA DUPLICATION AT ITS BEST FOR THE TOTAL PACKAGE

CONTACT:

VICTORY SILVER PRODUCTIONS LTD.,
22 COURT ROAD INDUSTRIAL ESTATE,
CWMBRAN, GWENT. Tel: 06333 72327/8

CLASSIFIED

Semi-display — £5 per single cc
Lineage — 20p per word

CALL DIANE DAVIS ON 01-437 4343 FOR SEMI/DISPLAY ADVERTISING

GAMES SOFTWARE

LYNX SOFTWARE

THE WORM Our best yet! Guide Wilberforce to the flowers without mishap. You will not want to stop! **£5.95**
REVERSALS Our version of popular board game Reversi in fast machine code. **£4.75**
Labyrinth — 3D Maze game. **£4.75**
CHANCELLOR — Run the UK economy for 10 years. **£4.75**
SPACE TREK — Zap the Klingons! **£4.75**
DISASSEMBLER — Examine machine code programs in standard Z-80 mnemonics. **£4.75**
(Add 10% for overseas orders).

Cheque/PO to:

QUAZAR COMPUTING, Dept. PCW,
67 Estcoats Drive, East Grinstead, Sussex.
Other programs available — send for details.
Dealer enquiries welcome.

Softcell presents Bomber Run for CBM 64

Les Allan's Star Game with interrupt based machine code, for fast, smooth action. Features include: Hall of Fame, five skill levels, demo-mode.
£4.95 including p&p.
To: Softcell,
28 Atkinson Drive, Newport,
Isle of Wight, PO30 2LJ.
Cheques and P.O.s. Enquiries.
Tel: 0983 525737 or 0983 295955

SYPHAX FOR 48K SPECTRUM. 100 different screens of jokes, quizzes, puzzles, British and world information, conversion charts, programming aids etc. For the whole family. Adaptable for your own use. **£3.50 including p&p.**
Rosetta Software, 2 Rosetta Close, Wivenhoe, Essex.

ATARI GAMES CARTRIDGES
SPECIAL OFFER. £10 each post paid.
Asteroids, ET, Raiders of the Lost Ark, Missile Command, Maze Craze, Warlords, Berzerk, Video Pinball and Night Rider.
Cheque/PO payable to **ETB Wholesale, 47**
Croftmead Drive, Milnrow, Rochdale OL16
3UE.

GAMES SOFTWARE

SPECTRUM PROGRAMS

BACKGAMMON	£5.95
3D VORTE	£5.95
IQ TEST	£5.00
HEATHROW	£7.95
NIGHT FLITE	£5.95
INVADERS	£4.95
ESCAPE	£4.95
HOME BUDGET	£5.00

Many others. SAE for list.
Prices including P&P.
Cheque/POs crossed, payable to:

VYAJY'S H-K
11 MARGARET AVENUE,
ST AUUSTELL, CORNWALL

SIGMASOFT. Killer snake for unexpanded Vic20. Eat insects with rapidly growing snake. Avoid mushrooms. Hi-scores, 10 levels. Fast hi-res multicolour graphics. Send £5 inc. p&p to R. Ball, 160 Kiln Lane, St. Helens, Merseyside.

SPECTRUM DISCOUNT GAMES

Manic Miner	£5.41
Invasion of Body Snatchers	£3.45
Hunter Killer	£3.49
The Pyramid	£4.90
Valhalla	£12.45
Kong	£5.10
Home Budget	£5.75
Hobbit for Spectrum, Commodore 64, Oric and BBC	£12.45

FLOWCHART Ltd
62 High Street, Irthlingborough,
Northants NN9 5TN
Phone 0933-650073
or SAE for lists stating computer.
Prices include post, packing and VAT

FOR THE DRAGON 32

MOVIE PRODUCER **£6.95**

SPECIAL OFFER

New Original Game.
Can you survive the movie business?
With 3D packaging and free red/green glasses.
CHEQUE/PO to: **ED 40, 249 HIGH ST.,**
STRATFORD, LONDON E15 2LS

ORIC GAMES. Five fantastic games on one cassette, we dare you to play! Only £4.99 including p&p. System Software, 54 Otter Way, Eaton Socon, Cambs.

£500 SPLAT!

HI-SCORE COMPETITION-CURRENT HIGH

James Tant 61195 points

(Subject to Competition Rules)

SPLAT THE 48K SPECTRUM CHALLENGE
AVAILABLE NOW **£5.50** INCLUSIVE
INCENTIVE, 54 LONDON STREET,
READING RG1 4SQ

SPECTRUM 48K CHRISTMAS EVE

A fabulous feast of frantic festive fun. Multi-screen game with colourful fast-moving machine code graphics.

Send cheque/PO for **£3.95** (UK only) to:
Colliers, 55 Walton Road, Frinton-on-Sea, Essex.
Overseas please add
50p to cover postage

16/48K SPECTRUM. "Raquel" presents her game for age 16 and over only (state age with order). Still only **£3.50**. I. Brooks, 17 Malvern, Coleman Street, Southend, Essex.

FOOTBALL POOLS PREDICTOR



For 16K ZX-81

Up to six methods of prediction. Enter matches played and draws. Program lists in order of preference. Works on British and Australian results, only **£4.95**
Matrix Software, 36 Yardley Wood Road,
Moseley, Birmingham B13 9JB

ORIGINAL SPECTRUM SOFTWARE.

35 well-known games including Time-gate, Penetrator, Jelpac, worth £185, will sell for **£85**. Tel: 0621-815533.
COMMODORE 64 & 8K/16K VIC20,
Soccerclub Boss; 88 teams, divisional
scoreboard, commentary, promotion,
relegation and more, £2.99 (also on
48K Spectrum). D. Spencer, 230 Low-
grange Avenue, Billingham, Cleveland.

VII SOFT COMPUTER SERVICES THE FRIENDLIEST SOFTWARE AROUND

— SPECTRUM OWNERS —

* SPECIAL OFFER *

BUY ONE * GET ONE FREE *

— YOUR CHOICE —

EACH PAIR COSTS £5.50 inc P&P

SUPER SNOOKER

Skill and judgement needed here

For 1 or 2 players

LORD OF THE UNDER WORLD

A deep and difficult adventure

You'll need nerves of steel

HOUSE OF CARDS

You build — the computer knocks down

You'll need patience for this

SEMAPHORE TUTOR

Teaches a useful language

and there's a word game to play

DONT DELAY — SEND TODAY

3 MORETON WAY, MOTTHAM, HYDE

CHESHIRE SK14 6RG

UNLIMITED SCORES ON MATRIX!
(Vic20, CBM 64). Experience all 20 levels by sending SAE plus 50p to Cairngorm, Roke Lane, Witley, Godalming, Surrey.

LOVE QUIZ. For courting and married couples, **£3.50**. Specgames: five games for all the family, **£2.50**. Both for 48K Spectrum from Mr K. Burton, 6 Westbourne Terrace, Barnsley, South Yorks.



Labyrinth of the Snappers

FOR ANY ORIC 1

The Snappers (Dwarfs mutated by radiation) are about to seize London. You must enter the sewers to find The Orb of Zifron, whilst fighting them with weapons and spells you find in the many chests. Be warned, the giant flea lurks in the darkness! Incredible value at only **£4.50** from: **P.W. Products, 8 Ravens-**
dale Avenue, Leamington Spa, Warwick-
shire.

Osborne 1 Games and Source code. "Doodle" allows easy doodling on screen with option to save or print the screen. "Pball" is a fast action pinball type game with 10 speeds and high score saved for each speed. Both provided on disc in both Basic and compiled version with printout of each. **£11.95** complete. **ShadeTree Software, 12 Jackson**
Road, Oxford OX2 7TR.

CLASSIFIED ADVERTISING RATES:

Line by line: 20p per word,
minimum 20 words.

Semi-display: £5 per single column centimetre, minimum length 2 cm. (Please supply A/W as PMT. Or supply rough setting instructions.)

Conditions: All copy for Classified section must be pre-paid. Cheques and postal orders should arrive at least two weeks before the publication date.

If you wish to discuss your ad,
PLEASE RING Diane Davis 01-734 2688.

Here's my classified ad.

(Please write your copy in capital letters on the lines below.)

Please continue on a separate sheet of paper

I make this words, at per word so I owe you £

Name

Address

.....

.....

Telephone

Please cut out and send this form to: Classified Department, Popular Computing Weekly,
12-13 Little Newport Street, London WC2R 3LD.

DISCOUNT SOFTWARE

	R.S.P.	Our price
Jumping Jack (Imagine)	£5.50	£4.50
Hobbit (Melbourne)	£14.95	£11.99
Ant Attack (Quicksilver)	£6.95	£5.95
Vahalla (Legend)	£14.95	£12.25
Mario Miner (Buy-Byte)	£5.95	£4.95
Heathrow (Hewson)	£7.95	£5.95
C.W.O. P&P 55p 1 tape, 2 or more post free.		
S.A.E. for 9-page catalogue, to: Discount Software, 45 Brunswick, Bracknell, Berks.		



ROBOT PANIC for your 16/48K SPECTRUM

Zap the aliens before the walls crush your Robot. Five rooms of escalating infestation — can you keep up? £5 from retailers (ask) or direct (24-hour dispatch).
**Soft Mill 20 Station Road
Haddenham Vic, Cambs CB6 3XD**

VIC20 GAMES. Christmas offer from Tournament Software. Two super, highly original tapes for standard Vic: 'Tournament 1' — Automania, Astradodge, Crossover, Trogen. 'Tournament 2' — Headshrinker, Luno, Gypsy Rose Vic, Vicbuzz. Outstanding quality. Great sound, colours, hi-res graphics, music, animation. Buy now for Christmas at special offer £7 for both tapes. Each tape alone at £3.95 (inclusive). Tournament Software, 63 Mansion Court Gardens, Thorne, Doncaster, South Yorkshire DN8 5BH. SAE for details.

DAVID SHACK SOFTWARE

Over 150 games for the Spectrum and 100 for the Vic20. Also BBC, C64, Dragon, Atari. Software sold at 10% discount.
SAE for lists to:
**294 RIMFORD ROAD, FOREST GATE, E7
Telephone 01-556 9303**

UTILITIES

AMAZING VALUE. Dragon Copycat copies your Basic or M/C programs (including autorun). Send only £4 to D. R. T. Lowe, Waterside, Little Ayton, Middlesbrough, Cleveland.
FOR VIC20. Arlon expansion (switchable), MC monitor, programmers aid, Forth, Maths and various games. Tel: 01-669 7108 (after 6 pm).
SOFTSAVE FOR THE VIC20, allows you to back-up most software on to a new tape, cassette with instructions. £4.95 from: Softsave, 65 Stonewood, Bean, Nr Dartford, Kent DA2 8BZ.

SPECTRUM KOPYKAT

IMPROVED PERFORMANCE

Simply the best. Copying any program is now as easy as LOADING and SAVING your own programs. Any ZX Spectrum program can be backed-up onto a fresh tape. Even programs that cannot be stopped can now be copied. 100 per cent machine code. Copies headless files. Prints file name. SPECTRUM KOPYKAT uses no program area so full size programs over 41.7K (9K for 16K machines) are easily duplicated. PLUS FREE Header Reader program. Immediate despatch by first class return post.

Send cheque/PO for £4.95 to:

MEDSOFT

61 Arden Road, Doncaster, DN2 5ER

IT CAN EVEN COPY ITSELF

SPECTRUM OWNERS

If you write your own games, this tape is a must. Contains machine code routines to move your objects one pixel at a time guaranteeing fast, smooth and flicker free movement. Gives a professional look to your software. £5.00

Trekward Ltd, c/o Swinton Hotel, Swinton Street, London WC1. Tel: 01-278 2033.

SPECTRUM 007 SPY COPIER. Makes back-up copies of all your tapes, guaranteed easiest to use; guaranteed to copy more types than any other copier. No gimmicks, therefore can copy even a full 16K/48K program. Note: only 007 Spy can also copy tapes to microdrive. Send £3.95 to: ZX Guaranteed, 29 Chadderton Drive, Unsworth, Bury, Lancs. Tel: 061-766 5712.

★ ★ TAPE COPIER ★ ★

The most advanced BACK-UP COPIER for ANY SPECTRUM available. MICRODRIVE COMPATIBLE. Does any other copier come near?

LOOK at only SOME of its options:

- ★ Maxcopy makes working copies of the full 16K or 48K!
- ★ Verifies. Repeat copies. Automatic abort. STOPS programs.
- ★ Loads CONTINUOUSLY (not just one part at a time like most copiers) even without pressing a key.
- ★ Copies HEADERLESS and ALL programs that we are aware of!
- ★ Very user friendly and simple to use.
- ★ LISTEN. We are so convinced that you will be pleased with our product that we offer a FULL MONEY BACK GUARANTEE if you are not fully satisfied. Cost only £4.50.

LERM, DEPT PW

16 STONEPIET DRIVE,

COTTINGHAM

MARKET HARBOURGH, LEICS.

SPECTRUM TRADE SECRETS, amazing booklet includes making programs unlistable, unstopable, invisible. How to list/reveal such, etc. Send £3. ZX Guaranteed, 29 Chadderton Drive, Unsworth, Bury, Lancs.

DRAGON DRAWING PROGRAM designed by artist, black and white, requires joystick. Drives RX80. Copy of instructions £1.10, cassette £9.50. K. Garwell, 5 College Road, Alsager, Stoke-on-Trent ST7 2SS.

SPECTRUM MENU OPERATING SYSTEM

MENUSYS is an operating system — a program for running programs. If you write lots of short BASIC programs, **MENUSYS** is for you. Install up to 15 BASIC programs, then control them with 1-key, menu-prompted commands. Pack more action into your 16K or 48K. Write short, user-friendly programs, using **MENUSYS** routines for menu control, forms-style data entry, and inter-program communication. Even a 10-line program becomes snappy and sophisticated. **UTILITIES** includes fully programmable toolkit (rename, rename, etc.), copy/back-up (save unfinished games in state-of-play). **MENUSYS** is mostly in BASIC, listable, copyable, endlessly versatile and comes with 20 pages of instructions. Get **MENUSYS** for Christmas: guaranteed to fascinate for at least 12 days. (It's like getting a new computer!)

MENUSYS for 16/48K SPECTRUM

only £4.95 inc. tape, book, p&p
To receive your **MENUSYS** s by return post send cheque/PO for £4.95 to:

Micro Accessories

40 Bowling Green Lane

London EC1 0ND

DRAGON KOPYKAT on cassette. Makes back-up copies of most machine-code programs — including protected auto-run, £5.95. D. Gill, 82 Carlton Hill, London NW8 0ER.

COMMODORE 64 OWNERS

Assembler — Disassembler, Machine Code, Programming cassette — £7.50
Light Pen Editor — edit — £7.50
Programs using your Light Pen — £7.50
Light Pen Assembler/Disassembler — £7.50

PLEASE SEND FOR DETAILS TO:

MICRO & VIDEO,

3 BEATRICE STREET, LATCHFORD,

WARRINGTON, CHESHIRE

SOFT SAVE FOR THE VIC20

Allows you to back-up most commercially available software or any memory size on to another tape. Cassette with instructions.

£4.95

SOFTSAVE, 65 STONEWOOD, BEAN,

Nr DARTFORD, KENT DA2 8BZ

TALLET MICRO LYNX

your computer to
excellent software.

MERRY CHRISTMAS!

188 New Road
Woodston
Peterborough BE2 9HA

for catalogue

EIGHT-CHANNEL analogue to digital converter for 16/48K Spectrum. Easily accessed from Basic programs. Send £37.95 to Exeter Electronic Services, 1 Bartholomew Street West, Exeter, Devon.

SPECTRUM SPEEDLOAD — Reduce your waiting time with this short program which lets you save and reload at 3000 baud on a standard cassette recorder. Easy to use with any tape command. Cassette (48K only) — £3.95. Ness Micro Systems, 100 Drais Avenue, Inverness IV2 3SD.

SPECTRUM AUTOKOPY 3

Take back-up copies of any Spectrum tape. But do not break copyright or conditions of sale.

NOW MORE POWERFUL THAN EVER The most advanced copier yet produced. The only copier really capable of copying programs the full 16K or 48K long. Even copies programs recorded from the bottom of Rom to the top of Rom, in one go!

A massive 32K or 64K capability. Copies Basic, machine code, headerless. Auto copy on tape loading error. No protection device too difficult.

Use Autokopy for programs the other copiers will not copy. Backed up by fast, friendly service. Your earlier versions updated if you return tape together with 50p.

Send £3 only to: B. Tidd,
160 Howlands, Welwyn Garden City,
Herts AL7 4RG.

SPECTRUM 007 SPY. Make copies of all your tapes. Basic, bytes, screen and headerless. Even copies other copiers. No gimmicks, therefore can copy full 16K/48K. Guaranteed easiest to use. Guaranteed to copy more tapes than any other copier. With free header reader and program to Stop/Study machine code programs. Microdrive compatible. Send £3.95 to: ZX GUARANTEED (PCW3), 29 Chadderton Drive, Unsworth, Bury, Lancs (tel: 061-766 5712).

BREAKER BREAKER

for the Commodore 64, makes back-up copies of most popular cassette programs. Protect your software investment, £3.95. C. Kent, 26 Northcote Walk, Corby, Northamptonshire.

SPECTRUM TRADE SECRETS. Includes making programs unlistable, unstopable, invisible. How to reveal such programs, etc. £3. ZX GUARANTEED, 29 Chadderton Drive, Unsworth, Bury, Lancs.

SPECTRUM Kopykats microdrive, only 007 Spy includes a program to let you copy machine code tapes on to micro-drive. See 007 Spy advert.

VIC IMITATOR

Copies virtually all Vic20 cassette-based programs, including basic machine code, multipart programs and programs using various protection techniques. Written in machine code. Easy to use. Works on any memory size. For a quick delivery, send Cheques/POs for £6 to:

IAN WAITE, DEPT. PCWK,
11 Hazlebarrow Road, Sheffield
S8 8AU

BBC "CLONE-2"

Tape back-up package — ★ Any O/S ★ Any Basic ★ Files
★ Locked programs Only £4.00 with free 8-colour Simon game! M. A. Paris, 38 Woodburn Manor Park, Woodburn Green, High Wycombe, Bucks.

HARDWARE

COMPUTER DATA RECORDER, battery/main, tape meter, £29.90 plus £2 p&p. Dragon on/off indicator. No soldering. Indicates if PSU is on, £3.90 plus 50p p&p. Mail order only. Both include one C12. M. J. Swanson, High Street, Spilsby, Lincs.

FLOPPY DISC INTERFACE FOR SPECTRUM

FDC-1 interface card, with Disc operating system in EPROM, and a Utility disc. £70.00 ex VAT. £81.50 inc. VAT, P&P.

FDC-1 Mk2. As Mk1 but with a Spectrum edge connector for further Cards, e.g. printer interface.

£85.00 ex VAT. £96.75 inc VAT, P&P

Centronics interface for Spectrum — £29.00 plus VAT

We also sell disc drives for above interface

Further details available from:
TECHNOLOGY RESEARCH LTD.,
356 Westmount Road, London SE9 1NW.
Tel: 01-856 8408

CHIPMUNK for discount hardware, e.g. Commodore 64 £189, Atari 800XL £225. SAE for price list. Chipmunk, Sterling House, 231 Whitby Road, Ellesmere Port, Cheshire L65 6RT.

LYNX LYNX LYNX COMPLETE KEYBOARD PACKAGE OF A DATA STAND PLUS DATA CARDS

- Quality DATA STANDS to help in typing in programs.
- DATA CARDS contain full keyboard information.
- Keyboard entry of user defined graphic characters.
- Also a new approach to number conversion.

Avoid those 'Q's & 'I's'! **£14.95 inc. p&p**

Dealers enquiries welcome. Cheques & PO's only.

PERIPHERAL PRODUCTS LTD.

209 KENTON LANE,

KENTON, MIDDLEX,

Tel: 01-907 3408

ZX OWNERS

BANISH LOADING PROBLEMS

for only

£14.99

inc. VAT — Post FREE

ELINCA PRODUCTS LTD.

LYNX WORKS, CAPT. STREET,

SHIFFIELD S10 2JY

SOFTWARE

TRY US FOR CBM64 SOFTWARE

We don't offer discounts but we have a unique BUY-BACK trade system, e.g. MOTOR MANIA (with trade) £4.50. MONOPOLY (with trade) £3.00. Send SAE to JAYCEE SOFTWARE. FREEPOST (no stamp). FORRES IV36 0BR.

BRAG. Spectrum 48K. Can you outwit your computer at the classic game of bluff? At level three this highly entertaining and original program beats even its own programmer! Only £4.95. Despatch by return. T. Lebon, Little Brays, Brays Lane, Rochford, Essex.

CHAPMAN AND BECKINGHAM SOFTWARE

Present for the 16/48K ZX Spectrum:

REVERSI	£4.00
CUBE SIMULATOR	£4.00
MATHS (5 to 10 years)	£3.50
SQUIRM	£4.00

For the 48K Model:

ADVENTURE ONE	£3.50
Send cheque/PO to: 12 Little Howe Close, Radley, Abingdon, Oxon OX14 3AJ	

SPECTRUM SOFTWARE, sell or swap. Valhalla and Black Crystal £6 each. Instruction books lost. Perfect working condition. Tel: 0793 695034.

SOFTWARE PIRATES! Get MENUSYS for Christmas! Makes copies of itself at the touch of a key! Only £4.95. See MENUSYS advert.

EDUCATIONAL SOFTWARE

SPECTRUM TEACHER DATA

MARK PROCESSOR 48K SORT GRAPH, GRADE

"Genuinely useful" £5.20

BRIAN FARRIS
8 THOMPSON ROAD
BOLTON

EDUCATION SOFTWARE for Spectrum 48K. GCE, O/CSE Physics, six programs, £6.50; Chemistry, six programs, £6.50 or both tapes, £12. Think Tank, Dept. PCW, 35 Wellington Road, Wimbledon Park, London SW19 8EQ.

FOR HIRE

TO HIRE A COMPUTER from ZX81 upwards, ring or write to Business and Computer Services, 292 Caledonian Road, London N1 1BA. Tel: 01-607 0157.

DEALERS

SOFT MACHINE

OPEN MON-SAT, 10.30-6

We offer a selection of the Finest Books and Software currently available for: Oric, ZX81, Spectrum, BBC, Dragon, Vic20 and Commodore 64 Microcomputers.

3 STATION CRESCENT,
WESTCOMBE PARK,
LONDON SE3.
Tel: 01-305 0521

or send SAE for free Catalogue
(State which Computer)

CONTACT ANGLIA COMPUTER CENTRE for the Spectrum 16K plus 48K, Vic20, Dragon, Lynx, Vic and Epson HX-20. Tel: (0603) 667-036. (Unbeatable prices.)

CHRISTMAS SPECIAL OFFERS

Quickshot Joysticks £8.50
Program Data Recorders £23.00
C15 Blank Data Cassettes for 55p, boxes of ten
BBC Model B £399.95
+ Free Tape Recorder

All prices incl. of VAT and P&P.
Cheques/P.O.s crossed,
payable to Jayson's.

JAYSON'S
20 CHESSINGTON AVENUE
LONDON N3 3DR
Tel: 01-349 3638 2498

ANYTIME FOR A 5-STAR SERVICE
TRADE ENQUIRIES WELCOME

COMMODORE 64 £164
(Excluding VAT)

Disk drives and cassettes also available
Tel: Floyd Patterson; Tel: 01-969 0819
or send SAE

Image Science Micro Computers Ltd
189 Freston Road, London W10 6TH
or cheques/P.O.s (add 15% VAT) and £8 for
p&p Securitor delivery

Full after-sales maintenance on all
Commodore equipment bought from us

A RETAILER for Sinclair accessories in the North of England. We are situated near the M1 and M62 motorways. As well as a complete range of hard and software, our service department can repair, modify or fit a wide range of accessories. Hours of business 10 am — 8 pm Tuesday to Saturday inclusive.

TELEPHONE PHILIP COWLEY ON
0924 272545

4 WESTLEY ST, OSSETT, W. YORKS
PLEASE RING FOR DETAILS OF OUR
MAIL ORDER SERVICE

FOR SALE

DRAGON 32, only three months old, perfect condition, £110, also Intellivision, unused, plus three cartridges. Offers. Tel: Milton Keynes 72721 days, 70676 evenings.

48K SPECTRUM + £60 OF SOFTWARE, including Flight Simulator, Address Manager, Melbourne Draw, and machine code test tool and text book — also two other text books + back-dated Sinclair user mags, £100. Tel: Ruislip 38620.

48K SPECTRUM, loads of games, books, magazines, only 3 weeks old, as new and packed, only £115. Ring 01-794 9655 (after 6 pm).

16K ZX81 for sale, professional keyboard (cased) + graphics Rom, U.D.G. over £100 software, £140 ono. Tel: Consett (0207) 501439.

VIC20, recorder, 16K Ram, joystick, lots of software, good condition, worth £350, will sell for £150 ono. Tel: 01-390 5671 (after 4 pm).

21K VIC20 C2N cassette unit, cartridge and cassette games, dust cover, £120 ono. Tel: (07073) 39541.

48K SPECTRUM, printer, carrying case, over £400 of software, 17 originals including Scrabble, books and magazines, £230. Tel: 01-904 4964.

BBC MODEL B — 1.205 cassette recorder, joysticks, micronet modem, books and magazines, including £50 worth software. All excellent condition, £350. Tel: Preston (0772) 323148.

BBC B SOFTWARE. Leading titles from main software houses. All originals. Very good condition, choose from large list, any three for £12. Tel: Preston (0772) 323148.

SERVICES

★ **DRAGON TAMERS!** ★
IS YOUR LATEST MASTERPIECE
GIVING YOU A HEADACHE?

A Quality Hard-Copy would be the professional approach
NO PRINTER — NO PROBLEM!
Allow us to list your programs
Send £1 per Tape plus 75p per
Program. Cheques/P.O.s payable to:

DATAPRINT

32 Wickham Road, London SE4

ZX81 — SPECTRUM

We can now offer out-of-guarantee repairs by our Computer Dept. Our engineers have had over three years' experience servicing Sinclair Computer products. Price including p&p, ZX81 — £11.50; 16K Ram — £9.95; Spectrum — £18.75. Send with cheque or P.O. T.V. Service of Cambridge Ltd, French's Road, Cambridge CB4 3NP. Tel: (0223) 311371.

js records

COMPUTER PROGRAMS
REAL-TIME or (Slow) HIGH-SPEED Professional Cassette Duplication and Blanks from 1 to 1,000+ Computer printed Cassette Labels, etc. Fast Security Delivery service.
js records — a division of FILTERBOND LTD, 19 Sadlers Way, Hertford SG14 2DZ. 0992 55188.

SPECTRUM PROGRAMS required by Turtle Software for guaranteed New Year marketing, good royalties paid, everything considered. Send to Turtle Software, "Wychwood", School Road, Finstock, Oxfordshire, SAE for details.

RECRUITMENT

PHOENIX SOFTWARE

Are looking for Machine-Code Arcade-quality games. We have an idea which could make your game the best seller in Europe.

Send your program to

PHOENIX SOFTWARE
Spangles House
116 Marsh Road
Pinner, Middx.
or Tel:

01-868 3353
NOW!!!

AQUARIUS

BUNCH OF FIVE CASSETTE (Snake, Master-guess, Symon, Bomber, Hi-Lo) £4.95
CASSETTE RECORDER LEAD £1.95

SPECIAL OFFER

Order both: get £1 off total

SPECTRUM Save wear and tear on your power socket with our own
RESET SWITCH £3.95

PROCESSOR LTD.
A.O.S. House
1 Willow Parade
CRANHAM
Essex RM14 1DZ

SPECTRUM SPECTRASOUND £9.00
Audio through your TV
+ 60p p&p

SAE for further details
MAIL-ORDER ONLY

COMPUTER SWAP

Computer Swap entries are limited to 30 words. Either fill in the accompanying form and send it to Computer Swap, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD or telephone 01-734 3454.

All software offered through computer swap must be in original condition and for private sale only.

Warning: It is illegal to advertise pirated software.

COMPUTER SWAP

Please write your copy in capital letters on the lines below.

Name.....

Address.....

Telephone.....

MAGAZINES



DRAGON USER

To make the most of your Dragon you need **Dragon User**—the independent magazine for Dragon owners. To make sure that you receive a copy of Dragon User regularly subscribe direct to us. A year's subscription costs £8 for 12 issues or subscribe for two years for £14.40 and receive a free copy of either **The Working Dragon** or **Dragon Gamesmaster** (overseas rates available on application). Send a cheque or postal order made payable to Dragon User, and accompanied by your name and address, to Dragon User, Subscriptions Department, Oakfield House, Perrymount Road, Haywards Heath, Sussex RH16 3DH.

ACCESSORIES

SPECTRUM DUSTCOVERS Only £1.75 (inc. P&P)

Smart top quality Blue 'Galaxy' PVC with silver Spectrum 'flash'. Unique design permits leads and most interfaces to remain connected.

PDQ Software, 'Parsley Rye'
Hilders Lane, Edenbridge, Kent
Dealer enquiries welcome

Protect your 5 1/4 floppy discs in durable plastic wallets. Each wallet protects up to four discs with highly professional appearance. £1 single wallet or 60p each for orders of 10 or more. **ShadeTree Software**, 12 Jackson Road, Oxford OX2 7TR.

CLUBS

SOFTWARE LIBRARY FOR SPECTRUM AND ZX81 OWNERS

Why buy a game, when you can have up to seven for the same cost?

SPECIAL OFFER:
The first game you hire absolutely free. Membership fee only £4.50. Cost of hire for seven days—70p (plus 25p p&p). Send cheque/PO for £4.50 made out to: Fifth Dimension Software. We will send you our list covering a wide range of games together with your first three games.

FIFTH DIMENSION SOFTWARE, 10 MADELEY CLOSE, MARUS BRIDGE, WIGAN, LANCs.

All tapes used with manufacturers' permission.

COMMODORE 64 USERS. Would you like to exchange software in either cassettes or disks? Please write or send programs to David Lee, Wolfstram 1, 6520 Worms, West Germany.

VIDEO GAME CLUB by the Spectrum specialists. Phone 01-459 0831 for details of special offer and catalogue of latest software available.

FOR SALE

SUPER EXPANDER CARTRIDGE. Super Lander cartridge and Bug-Byte Vicmen and Asteroids for Vic20. Sell for £40. Tel: (0333) 320834 after 5 pm.

T1994A for sale, £60 or swap for Spectrum/Vic20. Tel: 01-986 668 (after 6 pm).

ORIC 1. Brand new, with £30 of software, guaranteed, £100. Tel: 01-987 4480.

WANTED

WANTED

Quality Games and utility programs for any Micro. All programs considered. *Instant cash plus royalties, on all programs accepted with a view to distribution in UK, USA and Europe.*

Dream Software PO Box 64
Basingstoke, Hants RG21 2AB
Tel: Basingstoke (0256) 25107

AMATEUR/PROFESSIONAL ASTROLOGER required by publisher for exciting project. If you know what we are after contact Box No. PA1, c/o Popular Computing Weekly, 12/13 Little Newport Street, London WC2R 3LD.



is seeking authors for new titles to add to its highly original and successful book range. Experienced and first time authors are invited to submit manuscripts, ideas or fields of interest. Full details of what we can offer from David Lawrence, Book Editor, Sunshine, 12-13 Little Newport Street, London WC2R 3LD.

Sunshine: Publishers of Popular Computing and Dragon User

URGENT

We urgently require for a nationwide retailer, quality Arcade games, for Vic20 and Spectrum machines.

Best prices paid for the right programs.

RAINBOW RESEARCH
288 HIGH STREET
PONDER'S END, ENFIELD, MIDDx

Computer Swap 01-437 4343

Free readers entries to buy or sell a computer.
Ring 01-437-4343 and give us the details.

Spectrums for sale

SPECTRUM SOFTWARE: Escape, Jawz, Diddums, Micro Chess, Blind Alley, Desert Patrol, Lunar Rescue, will swap for Vic20 software or £20 lot. J. Croxell, 9 Granville Road, Lancaster, Lancs LA1 2PA.

SPECTRUM SOFTWARE: VU-3D £6, Spectrason, Zip-Zap £4, Spectres, Battle of Britain, Speakeasy, Aquarius, Games 5 (Star Trek), Mined-out £3, Interpreter Micro Interface £8. Tel: 01-393 3909 (after 6.30 pm).

SPECTRUM SOFTWARE for sale, Winged Avenger £2, Ground Attack £2, 3D Tanx £2. Tel: Paul on 01-540 8053.

EPSON MX80 F/T, dot matrix printer, £250. Tel: Ramsey (0487) 842135.

SPECTRUM SOFTWARE, superb condition, all 1/2 price, Aquaplane, Jumping Jack, Molar Maul, Planet of Death, Escape 3D, Tunnel, 3D Tanx, Faustus Folly. Tel: Dan, Reigate 48554 (after 4 pm).

SPECTRUM 48K plus 50 games including Arcadia, Spookyman, Cosmos, Light Cycles, Jetpac etc, all latest games including games designer, £165 ono. Tel: Bedford 61069.

SPECTRUM 48K with Kempstone joystick, interface and 12 games including Hobbit, Trans-Am, Manic Miner, Transylvania Tower, Horace Goes Skiing and more with cassette player, only £110. Poole 0202 686423.

LOOK! Spectrum software, Golden Apple £4, Jumping Jack £3.50, Ah Diddums £3.50, Planet of Death £3.50, Pimania £5, Over the Spectrum (book), £4, May swap. Tel: 01-472 4165, ask for Trevor.

48K SPECTRUM, printer, many games including Hobbit, Zoom, many more, tape recorder, computer consul, many books and magazines, £185 or swap for Commodore 64 plus tape recorder. Tel: 01-304 1333.

SPECTRUM joystick, interface £5. Tel: Stevenage (0438) 811634 after 7 pm.

ZX SPECTRUM TAPES for sale, Hungry Horace, Horace Goes Skiing, Horace and the Spiders, Planet of Death, Inca Curse, £2.50 each or £10 for all. Tel: Worthing (0903) 211439.

SPECTRUM SOFTWARE. All perfect originals including Scrabble, Flight, Simulation, QS Chess, Inca Curse, Golden Apple, Monopoly, Magic Mountain, Pharaoh's Tomb, M.Coder. All half price plus postage. Tel: Rugby 73594 evenings.

SPECTRUM SOFTWARE and books for sale, 20 tapes in all, £60 ono or swap for CBM 64 software. Tel: Uxbridge 55497 after 6 pm.

48K SPECTRUM, £70 software and £180 of good condition Lego. A very large and up to date collection. Swap for quite new BBC Model B. Tel: Burgess Hill 2760 after 5.30 pm.

48K SPECTRUM, ZX printer, five rolls of printer paper (with manuals and boxes), three machine code books (Z80), software including assembler, £170. Tel: Southend 586841.

80K SPECTRUM, printer, Kemston joystick, eight professional cassettes, 20+ magazines, five books, securicor delivery, worth over £300. Great Christmas present at only £199 plus p&p. Must go soon! Tel: 03302 2505.

Ataris for sale

ATARI VCS, good condition, 10 cartridges, £99. Tel: 01-935 9887.

VIC20 with 8K stack storeboard, also Vic20 software, including Vic Panic and 'O' Level Revision programs for physics and English, 2 cartridges with Sagon 2 Chess and Superlander, £190. Tel: 051-722 3735.

VIC20, C2N, joystick, four cartridges, £100. Tel: 01-935 9887.

ATARI 400 48K including Basic cartridge and manuals, 410 recorder, pair of joysticks and approximately £100 of software including Star Raiders and Soccer, £175 ono. Tel: Huddersfield (0484) 663338.

ATARI VCS with 6 cartridges including Star Master, Asteroids + Space Invaders, £90 or swap for Spectrum. Tel: 01-303 5384 (after 6 pm).

ATARI 400 16K with 2 joysticks + cassette recorder with £150 of software, sell for £200. Tel: 01-673 6782, Mr Chan.

ATARI 400 16K, Basic cartridge + manuals, lots of software and Atari joystick, great Christmas present, £110. Tel: 04446 41198.

ATARI 400 48K, recorder + £150 of software, joystick as new, one year guarantee, only £250. Tel: 01-550 0806 or swap for BBC B (after 6 pm).

ATARI 400 16K + 410 tape recorder, joystick, Basic + £200 of software, sell for £130 ono. Tel: 01-840 5278.

Wanted

SWAP PIRATE COVE for any other in series except Adventureland, will sell colour tv game for £10. Tel: Hamilton 0698421 327.

VIC20, Adventureland cartridge, will swap for any other Scott Adams adventure cartridge. Phone Huddersfield (0484) 21532, before 6 pm.

WANTED C2N cassette recorder for Vic20 + Ram unit. Tel: 0424-224867.

48K SPECTRUM SOFTWARE to swap, especially interested in Educational programs. Tel: 01-595 4923.

SPECTRUM HANDBOOK, Kempston joystick, interface, VU-File, Arcadia, "Dragon-32 and how to make most of", Dragon Mountain, Personal Finance, and 8 games in one, swap for anything Vic-20 or offers. 5 Worthington Close, Runcorn, Cheshire.

SWAP Atari VCS cartridges for other cartridges, Raiders of Lost Ark or Amidar for Yars Revenge, also Berzerk, Phoenix, Demon Attack, plus 10 other top games. Phone Leeds 867922 (evenings).

SWAP Vic20, boxed, excellent condition, cassette deck + £140 of software + 8K Ram + joystick for 48K Spectrum with software + joystick, interface. Tel: Buckley 546343 (after 6 pm).

SWAP Oric-1 48K, cassette player, £50 software, printer voucher, all new, worth £250, plus cash for Atari 800 or Commodore 64 or offers around £140. Tel: Andrew, Melton Mowbray 60281.

SPECTRUM 48K WANTED, issue 2 preferred. Please phone "Mac" on 0742-668955 (Sheffield).

WILL SWAP my intellivision + up to 10 cartridges for a 48K Spectrum. Tel: 0482 210629.

Acorns for sale

BBC MODEL A 32K, will run any software, can be upgraded cheaply to a full model B, £220. Tel: Hamilton (0698) 428438.

ACORN ATOM 12K + 12K + SP, complete with leads + manual, £120 of Acorn software, £140. Tel: 0480 76397.

BBC MODEL B HIGH QUALITY SOFTWARE, Fruit Machine — features hold, nudge, gamble, collect, killer line and code-break, all for only £3.70 (tape), £5.00 (disc). Rebelsoft, 19 Trelawney Road, Saltash, Cornwall PL12 4DB.

ACORN ATOM 12K/12K, toolbox, Rom, Eagle PSU, Bug-Byte "747", "Chess", "Invaders", Acornsoft "Peeko-Computer", 3 books, only £100 ono. Tel: (0202) 482761.

DISK INTERFACE for BBC micro with full fixing instructions, at present fitted to issue 3 board, for £55. Tel: 01-202 6410 after 6 pm.

For sale

BUSINESS COMPUTER, ideal for small business, consists of I.M.S. 5000, 48K to 128K, three-disk drive, remote, terminal (monitor keyboard and numeric keyboard), software available. £1,100 ono. Tel: Dorking 731 114.

TRS80, 16K, good condition plus manual and leads, cassette, recorder, books plus over £130 software, £200. Tel: Newcastle upon Tyne 09128 59440 after 5 pm.

PRINTER, Dot-matrix, plain paper friction feed printer, uses standard type-writer ribbons, cost over £500. Perfect order, accept £125 ono, including free Pet/CBM interface and paper and all leads, etc. Tel: Chester 675717.

MOREX PRINTER INTERFACE, as new, with manual and software (Tasword), £40 ono. Tel: 434-2074 after 1 pm. (Six months guarantee).

FOR SALE. More than 20 original Spectrum tapes. All in excellent condition includes all 16K imagines, quicksilva, etc. All half price. Tel: (0723) 64592 between 5 pm and 7 pm only. (Private sale).

SWAP OR SELL T199/4A + joysticks + cartridge + software for £120 or will swap for Oric I with or without software. Tel: Hornchurch 57487 after 5 pm.

VIDEO GENIE, 16K Ram, integral cassette + documentation, utilities, £50 ono; Printer Interface, £20; Centronics 779 printer, £100. Tel: 01-670 5448 evenings.

NEW BRAIN AD, complete with leads + manual + Reno tape + info, good machine, very good condition, quick sale needed, £160. Tel: 0452 67725 after 6 pm.

TEXAS INSTRUMENTS T159 calculator, hardly used, with master library Rom + 30 magnetic cards, complete with box, manuals + 3 s/w books, converter to TI program calculation, only £90. Tel: 0532 561 811.

SHARP MZ 80K, as new, full literature + 10 tapes, £250 ono. Farnborough, Kent. 51863.

TEXAS INSTRUMENTS T199/4A, extended basic language + Atari joystick, interface + books, manuals + programs, 8 months old. Today's price £210, sell for £105 ono. Tel: G. Crawshaw, High Wycombe 27807.

SEIKOSHA GP250X, 5 months old, with leads for BBC, £225. Tel: 01-575 1676 evenings.

EPROM HX20, 16K + extra leads, manual + printer paper inc carrying case. Will sell for £400. Tel: 04862 64033.

SHARP MZ80 P3 PRINTER + interface card + Apollo word processor programs, £315 ono. Tel: Langport (0458) 250130, Mr J. Chuter.

SHARP MZ80K, built-in screen + tape/recorder, basic tape, £250 of s/w, manual + ref guide, dust cover, £285. Tel: 01-455 6641 after 4.15 pm.

AMBECE PRINTER, 1 month old, suitable for Dragon or BBC, £65. APPLY TO NOBODY.

YOU CAN BE THE proud owner of an MZ-80K (48K) computer (monitor/cassette plus software, etc.) for cost £200! or swap for CBM 1541 disk drive. Tel: Cardiff 732955 after 5 pm.

ORIGINAL TAPES INCA CURSE £5, Arcadia £3.50, Space Invaders £2, 3D Tunnel £4, Centibug £2.50, 3D Tanx £2.50, The Hobbit £7, Zoom £4. All excellent condition. Will send. Tel: 021-742 7908.

ATARI VCS, paddles, joysticks, dust cover, nine cartridges including Chopper Command, Pac-Man, Asteroids, Bersek, Space Invaders and Night Driver, all in perfect condition, worth £250, bargain £150 ono. Tel: Southend 232420.

ATARI 400 48K BASIC RECORDER and manuals, also £1,000+ of software including Pole Position, Blue Maze, Miss Pac-Man, £175 ono. Tel: 0908 75094.

ATARI VCS with Pit Fall, Combat, Space Invaders, Asteroids, Phi Onx, two joysticks, pair of paddles, all boxed, very good condition, hardly used, cost £180, will sell for £95. Tel: Mrs E Riley, 500 7735.

VIC20 + 8K Ram + cassette deck + £40 games + books and magazines + 10 blank tapes, £130 in total. Tel: Gary, Cookstown (06487) 63712, after 4 pm.

VCS ATARI CARTRIDGES, between £8 and £10 each, titles include Space Invaders, Empire Strikes Back, Pac-Man, 65 titles in all, Tel: Biocrest 242408, between 5 pm and 6 pm.

T199/4A COMPUTER plus Extended Basic and Tombstone City. Over ten cassettes and cassette cable. Very good condition, ideal for Christmas. Tel: Edward on 570 3131 after 4 pm.

TEXAS T199/4A, joysticks, three cartridges: Parsec, Connect Four and Invaders. Eight cassette games, beginners Basic tutor, dual cassette lead. All still guaranteed, in good condition, £150 ono. Tel: Egham 35853.

TELETYPE KR 33, ideal cheap printer. Manual and stand, £50. Could deliver London/Oxford area. Tel: Malvern 68865.

SHARP PC1211 pocket computer and CE 122 printer/cassette interface. Three manuals, mains P.S.U. and printer paper, £60. Tel: 031-343 3725, Colin.

WANTED COMMODORE 64 preferably with cassette unit, swap for T199/4a with Parsec, Munchman, Invaders, Household Budget, Management (command modules) plus 21 cassette games and cassette lead. Tel: Cyrus after 6.30 pm.

SWAP DRAGON hi-res or Ghost Attack cartridge for Chess of swap both for J.C.B. sound of speech module. Tel: 01-821 1710 after 9 pm.

SPECTRUM SOFTWARE, swap Richard Shepherd's Ship of the Line and Trans Tower for Black Crystal, Valhalla or any one for Psst, Super Spy, any adventure. Tel: Jeff, (Birmingham) 779 3026.

LOADS OF SPECTRUM SOFTWARE to swap, sell two-thirds new price such as Scrabble, Conflict, Zues etc., swap for software or hardware. Call or write Austen, Kettering Court, Thornton Heath, Surrey.

BI-DIRECTIONAL 80-column dot-matrix printer, CBN Tronics OC serial 1/6 W manual, £220, unused MZ80K I/O box £75, serial board £60. Wanted twin floppies for MZ80K W. post board. Tel: Ray Pearce, Southampton 788278.

INTELLIVISION plus 14 cartridges including: Astrosmash, Frog Bog, Microsurgeon and more, worth £375, yours for only £150. Great value from P. Bevin, 62 St Denis Road, Selby Oak, Birmingham B29 1LR. Tel: (021) 476-6880 after 6 pm.

TRS-80 model 1, level 2, including manuals, books, all leads, PSU and much software, will sell for £150 or swap for Commodore 64 including PSU and leads. Tel: (0442) 52444.

T199 CASSETTES, leads and Munch Man cartridge, £50. Tel: 485 8393 after 5 pm.

DOLPHIN 80P PRINTER compatible with BBC but needs interface, can have 80 or 136 characters per line over 4000 sheets, 9in paper, £200 ono. Tel: 0268 412549 after 6 pm.

SHARP MZ 80K, 50K Ram Quantum, hi-res, 4-Basics Forth, two assemblers, disassembler, machine code, utilities and many games, manuals, monitor plus basic, listings, magazines, books, user notes. Excellent condition, dust cover, cost £800+, accept £450 ono. Tel: 01-889 1090.

UK101 SK, cased. Wemon monitor, ETI 2000 baud tape loader, £130. Tel: 085 682 200.

FOR SALE or swap. Sharp MZ80-A, excellent condition, hardly used, with 100+ programs and four languages, £300 or swap for BBC micro model A (or B). Other offers considered. Tel: (Bottwell) 853460.

ORIC 1 48K, never used. Bargain at £90. Tel: Kim, 01-673 6735 after 6.30 pm.

FOR SALE. Salamander, Franklin's Tomb, Star Jammer, Microdeal, Space War, Shuttle; Dragon Data Dr. Mountain. The lot £200 ono. Will separate. Tel: (Cornwall) Mawgan 500.

ORIC 1 48K computer, including bought software: Dig-Dog, Night Cycles, Oric Trek and Hopper plus leads and manual, £99. Tel: Sheffield (0742) 51235.

SHARP MZ80K 48K Ram, monitor and cassette, three Basics an assembler and Z80 manual and tapes, £150. Tel: 66322 Ext 2802 Burton on Trent (daytime) Mr Bolton.

HEWLETT PACKARD 85A desk top computer, 16K expanded to 32K, screen printer and micro cassette, print rolls and cassettes. Good condition, £1,145. Tel: Tadworth 3675.

T199/4A with extended Basic, Chess, Parsec, Munchman, Tombstone City, Speech Synthesis, cassette leads, Basic and games books, cost over £400, will sell for £200. David Hobbs (0442) 47661.

INTELLIVISION + 9 cartridges including Lock 'n' Chase, Dungeons and Dragons, Star Strike, Tennis, Triple Action, ideal Xmas present, cost £290, sell for £125 ono. Tel: 01-529 4357.

TEXAS T199/4A hardly used, still boxed, few tapes, 1 cartridge, 2 joysticks, beginners Basic cassette + many magazines and programs, bargain £100. Tel: Way 43916.

SHARP MZ-80K, 48K, built-in monitor and cassette, includes software, £200, buyer collects. Mr J. Jones, 94 Queensway, Didcot, Oxon.

LYNX 48K, all leads and manuals + PSU, introductory cassette + users group magazines, boxed, under guarantee, £175. Tel: 021-443 5361 (evenings or weekends).

MICROLINE 82A, dot matrix printer with graphic option, boxed, £200. Acornsoft view word-processor, £30. Tel: (0344) 886 178.

LYNX 48K + 8 games cassettes, manual + introduction tape, 2 books, user club news letters, guaranteed, £160. Tel: (0634) 402694 (after 6 pm).

SHARP MZ80K, 48K, Basic extension tape, data base cassette, 100 games and assorted programs, Sharp soft users notes, price £240. Tel: 054-3256138.

T199/4A, complete with cassette leads, Beginners Basic cassettes, and manuals, boxed, as new, offers invited, or would consider swap. Tel: (0252) 511248 (anytime).

FOR SALE, 1K ZX81 + keyboard + 4 books containing over 100 programs + manual and all leads, £25, very good condition, the ideal Xmas gift, buyer must collect or pay postage. Phone 021-772 3873, soon!

BBC MODEL B, Acornsoft, swap Rocket Raid, Arcadians, Killer, Cowboy Shoot Out, Dragon Chess. Tel: Derby 700088.

FULLER KEYBOARD, brand new, never used, worth £30, sell for £15. Tel: 01-698 5971.

HP41C + 3 memory modules + stats pack + maths pack + printer, £250 ono. Tel: 01-735 3681 (evenings).

SHARP MZ80A for sale, includes some software, £250 ono. Tel: Burnley (0282) 36327.

CENSORY G chess computers for sale, offers. Tel: 01-854 7913 rm 423.

T199/5, extension Basic, Attack cartridge, other software for £100. Tel: 074-488 2430 (anytime).

AGF, joystick, interface 2 for Spectrum, user's Atari joystick — works with many games like Manic Miner + Lunar Jetman, £12. Tel: Bristol (0272) 665504.

SCRABBLE, brand new in box, half price, £8. Write: 15 Frome, East Tilbury, Essex RM18 8TD.

PRINTER, TELETYPE MODEL 33, complete with papertape punch, reader and floorstand, can be seen working, ideal for conversion to computer printer, £40. Tel: Hemel Hempstead (0442) 67918 (after 6 pm).

FOR SALE, Bug-Bytes, Vic Panic original cassette, hardly ever used, accept £5, or swap for Another Vic in the Wall. Tel: Kidsgrove (07816) 3716 or 2640.

LYNX 96K upgraded machine including software, printer cable and books. Quick sale, offers over £200. Tel: 01-658 0645.

IKON HOBBIT floppy tape system for BBC, hardly used, including six data cassettes, zero memory Rom. Cost £195, accept first offer over £150. Tel: 01-658 0645.

FOR SALE: Dragon 32K in mint condition, includes over £160-worth of software, joysticks, manual and books. Will sell for £200 ono. Tel: (St Helens) 051-430 0741.

ORIC 16K plus one tape, worth £103. Unwanted gift, sell for £80 or swap for 48K Spectrum. Tel: Crawley 518460.

16K ZX81 and software, £45. Tel: 0505 842828.

ZX81s for sale

ZX81 plus 16K RamPack, printer, cassette recorder, £25 software, ZX81 executive case. Worth £155, sell for £115 or swap for Vic20 plus cassette. Tel: Wakefield 259767.

ZX81 16K, manual, leads etc, Sinclair belt, software: Pimania, Avenger etc. Best offer secures. Tel: Thorham Common 6421.

ZX81 16K Ram, leads, manual, machine code book, two games books, £60 of software including: Flight Simulation, Galaxians, Labyrinth, Space Raiders, £60 ono. Tel: Glossop 3516.

ZX81 SOFTWARE. Includes Brick-Stop, QS Scramble, QS Defenda and QS Asteroids. All tapes in original condition. Tel: 0984 23783 for details and prices. No offers ignored. No time wasters.

ZX81 16K, software — Trader, £6; Flight Simulation, £4; Orwell cassette four, £4, 3D Defender, £4, OS Scramble, £3; Space Raiders, £3. Mr A. B. S. Wheeler, 38 Bede Road, Barnard Castle, Durham.

ZX81 plus 16K Ram pack, with manual, including power supply, etc, software worth £16 and print 'n' plotter pad, well cared for, ideal for beginner, £50 ono. Tel: 01-960 0094 evenings.

ZX81 16K, leads, manual, PSU, books, £200-worth of software — all current, superb condition, would make a nice Christmas present, make me an offer, I might accept. Tel: 042 879 3813.

ZX81 16K plus leads and manuals + software including Pimania, Flight Simulation, Catacombs, Sorcerers Island, etc + Mastering Machine Code book by Toni Baker, £50 ono. Tel: 0787 (Essex) 475022.

ZX81, 16K memory pack, Kempson keyboard, case, box and £40 of software, selling it for £75. Tel: 01-670 3817.

ZX81 16K Ram, including books, programs and consul. Price £60. Mr Cruise, 3 Dorset Way, Twickenham TW2 6NB.

ZX81 16K Fuller keyboard, joystick and interface, software, book and magazines, cost £160, very good condition, £65 ono. Tel: Bourne End 24201 after 5 pm.

16K ZX81 plus £25 of software, immaculate condition, still boxed with manual, £40. Also Sinclair 16K Ram pack, as new, £15. Romford 61557.

ZX81 16K, Maplin keyboard, DKTronics graphic board, 4K + 2K chip, aluminium case 14 1/2" x 14 1/2", cassette recorder, leads, manuals, b/w TV, software, etc, swap for Vic20 expanded, games, recorder, manuals, or £120.

ZX81 16K Ram pack, QS Scramble, selling it for £55, offers considered. 01-575 3885, ask for Levine.

16K ZX81 + Fuller keyboard, excellent condition, with £50 of software and loads of magazines, will sell separately or the lot for £70 ono. Tel: 01-698 5971.

ZX81 16K, keyboard, sound pack, graphic Rom board, all in a consol case, £50 of magazines + books, lots of software + Tron, 14-inch b/w portable TV, offers over £160. Call evenings Ancoch, 01-998 8117.

ZX81 16K QUALITY KEYBOARD, 20 games, manual and leads, £65 ono. Tel: 0952 811399.

Commodores for sale

VIC20 with cassette unit, 3 months old, 2 games including Fly Snatcher, Blitz and Alien Blitz, Asteroids, Food Machine, sell for £120. Tel: (Hastings) 431198.

VIC20, C2N cassette deck, starter pack with Introduction to Part 1, 27 games, boxed, as new, 6 months old, 6 months guarantee left, sell for £150. Tel: Crawley 22141.

ORIGINAL VIC20 3.5 ARCADE GAMES, including Asteroids, Pucky, Astro-Land, Treasure Maze, Target Shoot, all on one great cassette and only for £3.95. Phone Northwich 782475 after 5 pm.

VIC20, plus 16K Ram, 6 months old, plus software, £125. Phone 01-989 1679 after 6.30 pm.

16K VIC20, cassette unit, super expander, Omega Race, hi-res graphics, book, joystick, many other games, worth £300, sell for £150. Tel: 0883 48554 (evenings).

VIC20 + cassette unit + 3K super expander + Star Battle cartridge + software, cost £265, sell for £120. Tel: 01-204 4596 (after 4 pm).

VIC20 + C2N cassette recorder + 8K, 14 games cartridges + Programmers Aid + Mission Impossible, £400 of software, Vic Revealed + compiler, Forth + Chess, worth £700, sell for £160 — will not separate. Tel: 01-579 2129 after 4.30 pm.

VIC MEN, original tape for Vic20, offers? Tel: Stevenage (0438) 811634 after 7 pm.

VIC20 SOFTWARE, over 25 Vic20 tapes (originals only) at £2-£3 each, e.g. Micropolis, Battle of Britain, Snooker, etc. Tel: 0438 811634 after 7 pm.

COMMODORE VIC20 FOR SALE, including games cartridge, £70 ono. Tel: Chorley (02572) 75035.

21K VIC20 + C2N + Introduction to Basic 1 + 4 cartridges + Point Master + £300 of software, cost £700, sell for £230 ono. Tel: Reading 883238.

VIC20 SOFTWARE to swap or sell. Tel: 05212 3503.

25 UNEXPANDED VIC20 GAMES (yes 25), including Ski-Run, Pontoon, Slot Machine, 5 adventures, hi/low, etc, only £5 !!! Phone Lye 3057 after 6 pm (ask for Adrian).

VIC20 SPEECH SYNTHESISER CARTRIDGE, cost £65, unwanted gift, with full instructions and demo cassette, £40 ono. Mr D. Oldfield, 50 Albion Terrace, Lymington, Northumberland NE61 5TA.

VIC 1540 SINGLE FLOPPY DISK to swap for Commodore 64 with cassette recorder or will sell for £220 ono. Tel: 0622 813794.

VIC20 + C2N + 3K + 8K + 16K + joystick + programme reference guide, etc. swap 48K Spectrum. Phone 01-858 2261 (daytime).

VIC20 + 16K (8K 3 slot motherboard + 8K cartridge) cassette unit, good condition, loads of software, joystick, 3 good books, only £130 ono. Paul Johnston, 7 Dunedon Road, Corby NN18 9JX.

VIC20, C2N + 16K + 8K, revision programs, Dr Watson's Assembly + over 45 original games, including Arcadia, Skyhawk, plus much more. Also manuals, reference guide, will sell separate or all for £250. Call Ketan at 788-0630 (evenings).

VIC20, £75 ono, innovative computing £20, Getting Acquainted with your Vic £20, Bug-Byte Asteroids £5, Backgammon £5, Audiogenic Amok £4, programmer's reference guide £8, Quicksilver Skyhawk £7, dusterover £1, Starbattle £7. Christchurch (0202) 483807.

COMMODORE 64 with cassette unit plus handbook and £30 worth of software, £200. Tel: 43636 (daytime), 371638 (evenings), Derby.

VIC20 with tape recorder, 20K expansion, joystick, £200 of software + books + magazines, sell for £150 or swap for 48K Spectrum. Tel: High Wycombe (0494) 716520.

VIC20 Adventureland cartridge, will swap for any other in Scott Adams series or sell for £8. Tel: Rochdale 0706 358419.

VIC20 lightpen + games, cost £34.50, bargain at £22. Ring 0743 60890 (after 6 pm) ask for Michael.

VIC20, 1 month old, Introduction to Basic Part 1, C2N tape recorder, Personal Computing for the Vic20, £20 software, sell for £100. Tel: 359 1151.

VIC20 + 16K Ram switchable + 2 games cartridges + programmer's reference guide + 20 games on tape + magazines, £99. Phone Walton (0932) 229646.

VIC20 16K RAM PACK, £300 of software, joystick, books, six months old, excellent condition, many cartridge games. All for £225. Tel: 881-1758 evenings.

VIC20 plus C2N cassette unit plus joystick, all leads and software, £110. Tel: (Southend) 0702 713755.

VIC20 plus C2N cassette, 8K, super expander, Buti, plus, motherboard, 14 games cartridges, literature and many games, worth £370, sell for £250. Tel: Boldon 363680 after 5 pm.

VIC20, cassette, joystick, £20 worth of software, manual, programmer's reference guide and magazines, £100 ono. Tel: 01-943 0856.

VIC20 DATACASSETTE BOOKS, 3K Ram, 16K Ram, Super Expander, 30-40 plus tapes, three games cartridges, machine code, monitor, good condition, boxed. Tel: 0203 (Coventry) 76831.

VIC20 CARTRIDGES for sale or swap for BBC B software, Avenger, Ratrace, Jelly Monsters, Alien, Star Battle, Road Race, Adventure Land, £120 each. Tel: Chelmsford (0245) 468954 after 6 pm or weekends.

VIC20 plus cassette unit, with dust cover and quick shot joystick, five books, lots of magazines and lots of software, i.e., games, music, educational, etc. Offers please. Tel: 061-339 3227.

COMMODORE-64 plus Commodore cassette player and games plus program book and magazines etc. Purchased last month. Mint condition. Offers realistically £250. Tel: 01-568 7325.

VIC20, still under guarantee, C2N cassette player, joystick plus two cartridges, eight machine code, games, Vic programmer's reference guide, £110 ono. Tel: Radlett 7506.

VIC20 plus cassette deck, Introduction to Basic Part 1, joystick and 16K switchable Ram Pack plus £80 of software and magazines and books, sell for £200. Tel: 6563824.

VIC20 BOOKS, software, £75; 16K Ram, Programmers Aid, Hesmon, £20 each. All boxed, as new. Tel: 654 4899 after 6 pm.

VIC20 Choplifter cartridge for sale, £20, cost £25 (needs a joystick). Tel: (0222) 842649 after 5 pm.

VIC20, 16K, C2N cassette deck, super expander, joystick, Jelly Monsters, Avenger Road Race, Adventure Land, Pirate Cove, Physics Revision, Cassettes. Excellent condition, sell for £150. Contact John Mudge on Uxbridge 38397.

COMMODORE VIC20 cassette deck, super expander, point master joystick, games including Avenger, Sargon Chess cartridges, 10 months old, £150. Tel: (0565) 4712.

VIC20 plus C2N cassette unit, joystick, dust covers, £50 of software and Vic magazines. All boxed as new, sell for £120. Tel: Sammy 01-958 5013 evenings.

VIC20 EITO/SOSTELL, under guarantee, C2N unit, plus expansion, all £130. Tel: Farnborough, Kent 54609.

VIC20, plus C2N plus 16K Ram and Introduction to Basic plus £75 of software, £168. Tel: 041-772 2055.

VIC20 C2N TAPE DECK, 32K Ram Pack, switchable to standard plus 3K plus 16K plus 24K plus 32K. One hand, quick shot, joystick, books, manuals and magazines. Cassette software. Under guarantee. Offers. Tel: 0981 250420 after 5.30 pm.

COMMODORE VIC-20 C2N. Lots of programs and books. All leads, 10 months guarantee. Boxed, for £100. Tel: 0506 414432.

VIC20 C2N super expander. Introduction to Basic Part 1 and many other books, software including seven cartridges and 15 cassettes over £500 when bought, will accept £350. Tel: Blackburn (0254) 662385 between 5 pm and 7 pm.

COMMODORE VIC20 with 16K Ram pack, C2N cassette deck, £165 of software, two educational cassettes, English and physics, one road race cartridge, one dust cover, Arcade software including: Martian Raiders and Paratroopers, £195. Mr. S. R. Kelshier, 22 Woodgrange Avenue, Kenton, Harrow.

VIC 15-15 PRINTER, including word pro. cassette and new ribbon, £130. Tel: Evesley (0734) 732268.

COMMODORE VIC20 3/8K, joystick, tape cassette unit, over 25 cassettes and three games cartridge, £200. Tel: Fareham 230956 or write to: 14 Drysles Close, Bridgeway, Gosport PO13 0SL.

VIC20 16K CASSETTE UNIT, £200 of software, £30 of books, one joystick, five cartridges, £220 ono or possibly swap 48K Spectrum with cassette and printer. Tel: Leeds (0532) 772818.

VIC20 SOFT SWITCH, never used, £18. Tel: Aldridge 51923.

COMMODORE 64 1541 disc drive, disc daylight pen, reference guide. All for £50. Tel: 01-603 2931.

VIC20 plus cassette deck and three joysticks. Many books, including Programmer's Reference Guide, loads of software, £150. Tel: Deneham 860 293 after 5 pm.

16K FOR VIC20 with five 16K games, £30. Tel: 01-387 8751 evenings.

VIC20 plus C2N 3K expansion cartridge, two games cartridges, 15 commercial software games, including adventures, and tape, copier and joystick, magazines and books, as new, worth £350, will sell for £150. Tel: Blackpool 692323.

VIC20, with 16K cassette deck, joystick, paddles, many magazines, cassette games, £170 ono. Tel: Romford 67307.

16K VIC20 plus cassette deck, joystick and paddles, magazines, cassette games, £165 ono. Tel: Uplminster 50552.

VIC20, 16K, C2N cassette, joystick, £150 worth of software, books, magazines, cost over £350, sell for £200 ono. Tel: Lindfield 2677 evenings.

VIC20 Adventureland cartridge, swap for Rat Race or other adventure cartridge except Count. Tel: Nottingham 204058.

COMMODORE PET 2001, built-in green screen plus cassette recorder, 64K, £200. Tel: Reading 666211.

VIC20, C2N 16K, 3K super expander, four games cartridges, Gorf, Sargon, Choplifter, The Count Adventure, £160. Cassette software, joystick, will not separate, £170 ono. Tel: Bexhill (0424) 221298.

VIC20 ALIEN cartridge, will swap for any Commodore adventure cartridge except Mission Impossible. Tel: Newton Abbot (0626) 3005 after 4 pm.

Tandys for sale

TANDY TRS80, still boxed, 16K colour with 2 manuals, £190. Tel: 873370 (Birmingham).

16K VIDEO GENIE, some software available, all leads + manual, £150. Tel: Lewington 2596.

32K GENIE, 2 weeks old, £120 or swap for Vic20. Mike, 01-701 4115.

VIDEO GENIE 16K, built-in cassette, 14" TV included, lots of extras, fully expandable, excellent condition, £230. Tel: Nottingham 384961 for more details.

COLOUR GENIE 16K, software, books, manuals, all leads, brand new in original packing, £180. Tel: (051) 678 9237.

Dragons for sale

DRAGON 32, guaranteed, boxed, new, plus leads, manuals, £15 of magazines, £6 of books, £113 of original software, ideal Christmas present, total £338 plus joysticks, offers. Ring 772 3939 after 5-7 pm, ask for Murtha Piggott.

DRAGON 32, almost new, £100 joysticks, cassette recorder, plenty of software, arcade games, adventures, etc, all very good condition, all for £200. Tel: Bedford 57407 after 5 pm.

DRAGON 32, 2 joysticks, cassette recorder, 3 cassette games, 2 cartridge games, nearest offer to £150. Tel: 01-888 7060.

DRAGON 32, cassette recorder, 30 tapes including Donkey King, Caterpillar Attack and Planet Invasion, two joysticks, books + magazines, £180. Tel: 01-703 7985.

DRAGON 32 plus 20-inch colour TV, over £100 of software, plus joysticks, 6809 machine code manual, etc, just £290. Tel: 0792 68894 after 6 pm.

DRAGON 32K computer games plus two games programming book. Worth £84, will sell for half price or £4 each, or swap for knitting machine in working order. Tel: (St Helens) 051-430 0741.

DRAGON 32, joysticks, cassette recorder, plus £20-worth books, £80-worth software including Cosmic Invaders cartridge, Donkey King, Frogger etc and Dragon User magazines. A bargain at £195. Tel: West Lothian 0506 37745.

DRAGON 32, nine cassette games, 10 books and two joysticks. Sell for £250 ono. Tel: Rugby 3655 after 4 pm.

DRAGON 32, three joysticks, three books, £230-worth of software. Offers around £170 considered. Tel: Bishop's Stortford 815623 after 5 pm.

DRAGON 32, £200 of software including £50 word processor, Sony cassette recorder, two joysticks and instruction manual. Cost £375, sell for £215 ono. Excellent condition, boxed. Tel: 01-440 2227.

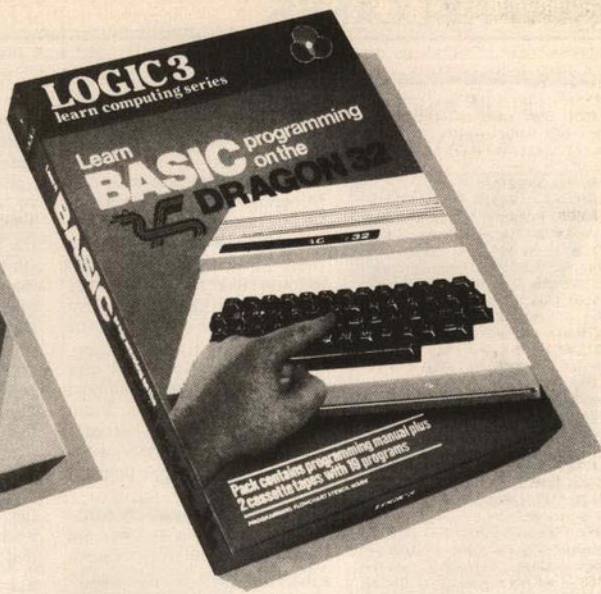
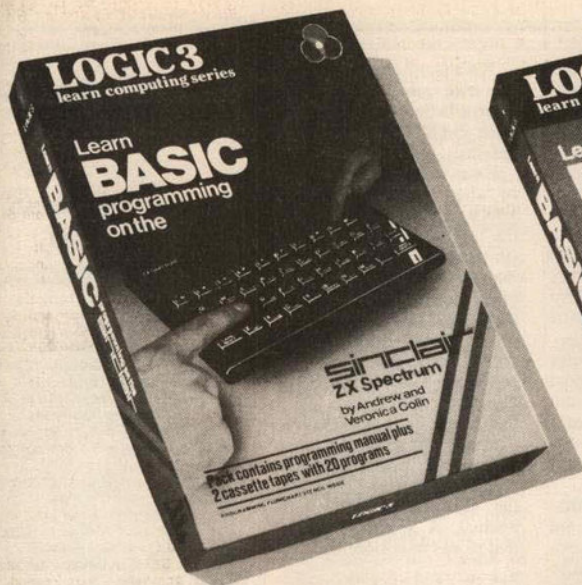
DRAGON 32K, together with joysticks, light pen, telewriter, word processor and games, £210 ono. Oric 1, 48K plus Oricbase, Zodiac and Flight, £110 ono. Phone Nigel 01-485 1383.

DRAGON 32, software, 2 joysticks, £430. Tel: 0744 27768.

DRAGON 32, boxed, joystick, 5 games, book + manual + 4 Dragon User magazines + all leads, £140. Tel: High Wycombe 715789.

DRAGON 32, tape recorder, joysticks, light pen, books, magazines and £41 worth of software, Dragon Trek, Pima, Crede, Quest, Defence, will sell for £200 ono or swap for CBM 64 + C2N cassette unit. Northampton (0604) 28319.

DRAGON 32, boxed as new with manuals, boxed dual Dragon data, joysticks, Calico Island and program books, £170 ono. Ring 061-998 8694 after 7.30 pm (not Wednesday).



THERE'S NO PRESENT LIKE THE FUTURE.

THE WORLD'S FINEST PROGRAMMING TUTORIAL FOR ONLY £12.95.

Thousands who own, or would like to own home computers have yet to experience the feeling of discovery that comes when you write your own programs. Yet learning programming can be easy.

'Learn Basic' from Logic 3 is the ultimate development of the method first devised at Strathclyde University—a straightforward, easily understood tutorial written by Professor Andrew Colin and Veronica Colin, authors of Britain's best-selling tutorial package.

Using the method tested by university students and used successfully by over 200,000 home computer users, 'Learn Basic' runs on your own computer and explains everything in clear non-American English without jargon or computertalk. In a matter of hours, you will be writing programs that work.

Essentially, 'Learn Basic' and the rest of the 'Learn Computing' Series that will follow soon are designed for people who want to keep abreast of the computer age. For people who realise that understanding computers is the key to future success, at school, at work and as a parent.

Make your future, and your family's future, richer this Christmas.

Get 'Learn Basic' by Logic 3—two tapes and a full-size manual for Spectrum or Dragon (others soon) at just £12.95.

At that price, it's a gift.

Buy the Logic 3 'Learn Computing' Series at computer shops and major retail stores all over Britain. In case of difficulty, write to Logic 3 in Windsor.

TO: Logic 3 Ltd, Mountbatten House, Victoria Street, Windsor SL4 1HE.

If you would like to know more about using and programming a computer in your home, send this coupon for your free copy of our 16-page explanatory booklet '100 things you wanted to know about computers'.

It will help you cut through the jungle of computer jargon, and give you news about software developments—even games. ☐

Or send for our software catalogue (tick either or both). ☐

Name _____

Address _____

LOGIC 3

— THE KEY TO THE WORLD OF TOMORROW. —

I have already/intend to get a _____ microcomputer (delete as applicable)

PCW 8/12

NEW RELEASES

UP UP AND AWAY



At last a genuinely interesting educational package for the Spectrum — *Ballooning* from Heinemann Educational Books.

The program itself involves piloting a balloon over various hills and mountains, using vents to lower you and the burner to raise you up. At various points in your trip you will be given different tasks to complete like getting and delivering medical supplies.

The manual/booklet not only describes the operation of the game, but is full of puzzles and information about the history of ballooning — all illustrated with photographs and colour drawings.

Other programs in the same series involve driving and being a special agent — your children might actually enjoy this series, maybe even learn something.

Program *Ballooning*
Price £9.95
Micro Spectrum 48K
Supplier Heinemann Educational Books
22 Bedford Square
London WC1R 3HH

DREADED BUGS

Lothlorien is well known for its excellent war-gaming simulations, so its latest move is slightly surprising — the company has released a series of arcade games for the Spectrum and Oric 1.

Micro Mouse is the Spectrum game and is superb. It

introduces an idea so obvious you wonder why nobody ever thought of it before. The program is about making a program.

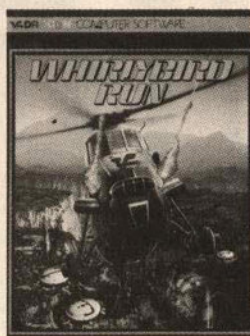
On screen are the lines of a program that won't run because some bugs have stolen some of the letters and numbers in the program. *Micro Mouse* has to retrieve the stolen letters and replace them in their correct positions in the program.

He is hampered in his task by the dreaded bugs whom he must avoid at all costs. From time to time *Micro* is given a chance at revenge via a can of Datakill which wipes them all out for a while.

Once a program is completed it will run and you are treated to another, more complex, program to debug. The game is graphically excellent with smooth-moving sprites.

Program *Micro Mouse*
Price £5.95
Micro Spectrum 16/48K
Supplier M C Lothlorien
56A Park Lane
Poynton
Stockport
Cheshire SK12 1AE

PRICE PROBLEM



One of the things that led to a falling off in the numbers of Dragon 32s being sold was almost certainly the lack of quality software.

Now that the Dragon has been given a new lease of life by various injections of cash, Dragon Data are obviously keen to ensure that history does not repeat itself. To this end, it has just issued 11 new games — all professionally packaged in what look like large video cases.

Whirlybird Run is a *Scramble* style game in which you pilot a helicopter over mountains and hills and past missile defences.

Later levels include swarms of alien fighters trying to knock you out of the sky. Like the original, you must replenish your fuel supply by bombing the enemy fuel dumps (why this should work is a mystery to me).

The game is graphically good, with the helicopter's rotors seeming to turn, and is also fast and addictive. Up to this point, then, I would recommend the game. The problem is the price — £12.95 really isn't justified even with the big box and two page manual. A Spectrum equivalent would cost more like £6.

Program *Whirlybird Run*
Price £12.95
Micro Dragon 32
Supplier Dragon Data
Kenfig Industrial Estate
Margam
Port Talbot
West Glamorgan

HELPFUL CLUES

Twin Kingdom Valley is an illustrated adventure game for the Acorn machines and the Commodore 64.

Like the *Hobbit*, it is basically a text style adventure, but with every scene illustrated. In this case there are 175 different illustrations — some of which may contain helpful clues so they are more than just dressing.

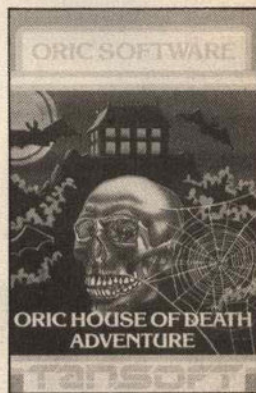
Judging by the screen shots the graphics are well up to *Hobbit* standard and in other ways the games are comparable — both, for example, feature the passage of time as an important ingredient. Both can manage quite complicated instructions and, more generally, their worlds are similar — full of dragons and caves, treasures and forests.

Bug-Byte doesn't seem worried by its illustrious competition (now that *Hobbit* is on BBC and 64) though. At the bottom of the advertisements is the legend 'Eat your heart out Bilbo!' — whether he will remain to be seen.

Program *Twin Kingdom Valley*

Price £9.50
Micro BBC/Electron/CMB 64
Supplier Bug-Byte
Mulberry House
Canning Place
Liverpool

FILM SET



Zodiac was the first of the Oric adventures to achieve anything like the cult status of the Artie adventures. So, there will be quite a lot of interest in the follow-up *House of Death*.

Although basically a text adventure in the classic mould, there are various puzzles and intelligence tests built into it.

The setting is a disused film set, the location for such classic horror films as *An American Werewolf in Guernsey*. The task is to find five treasures and return them to the starting place.

Aside from logical puzzles, problems can also take the form of monsters from the movies like werewolves, Dracula, etc.

Program *Oric House of Death*
Price £9.99
Micro Oric 1
Supplier Tansoft
Units 1 and 2
Techo Park
Newmarket Road
Cambridge

PURE FANTASY

For those of you who, like me, had their imagination fired by the sequence in *2001* when the space ship slowly docks with the space station to the music of the Blue Danube, a new program may help you live out your fantasy to the full.

2002 is a sophisticated simulation of the famous docking sequence, with you at the controls of the Orion spacecraft.

The high resolution of the BBC, coupled with superb 3D gives a spellbinding effect. There are six skill levels for everyone from the complete novice to the experienced astro pilot.

Program 2002
Price £7.95
Micro BBC B
Supplier Superior Software
Dept C
69 Leeds Road
Bramhope
Leeds

SLIDER TOY



Jumbly is here. Quite a few people wondered what those teasing adverts saying 'Jumbly is coming' were all about. Now we know.

Jumbly is a computer version of those slider toys in which you have to move around various plastic tiles to make a picture.

However, what used to be a couple of hours entertainment has been extended to a couple of months worth, by a number of special features. Most importantly, there are a series of pictures — what number has not been given away.

Some of the pictures scroll in different directions, making it much harder to see what you are doing. Each picture also has a target number of moves in which it must be solved — only if you equal or beat this will you be allowed to go to the next one.

It is absolutely infuriating and my reaction was to throw something at the tv — others

will doubtless get days of masochistic pleasure.

Program *Jumbly*
Price £6.95
Micro Spectrum 48K
Supplier D'K Tronics
Unit 2
Shire Hill Industrial Est
Saffron Walden
Essex CB11 3AX

ARCADE HIT

Every so often, seemingly by some sort of Jungian telepathy, all the software houses decide to bring out home micro versions of an arcade hit at exactly the same time.

This month it is the bizarre game *Qbert*. This involves bouncing a funny little creature up and down a stack of cubes trying to land on each one. This is made more difficult by the presence of various similarly bouncing missiles that tumble down the stack.

There are any number of versions of the game for any number of machines (although I have not yet seen one for Spectrum).

One of the best is *Humphrey* which is true to the arcade original in every way except that the layout of the cubes changes with each screen of action. It runs on the Commodore 64 and is graphically excellent.

Program *Humphrey*
Price £6.90
Micro Commodore 64
Supplier Mr Micro
69 Partington Lane
Swinton
Manchester M27 3AL

ABOVE STANDARD

If only it had the software back up the Texas TI99/4A would look excellent value for £90. Doubtless it's now far too late for this situation to change dramatically, but there are some interesting new programs around.

Adventuremania is a graphics adventure which uses all 16K and all colour sets. It's set in London — your first location is Trafalgar Square. The sleeve notes contain the dark warning 'beware the ungodly are everywhere', pre-

sumably this means the tourists.

The game is supposed to be fiendishly difficult — you don't even find out where you are going and what you are supposed to do until you find the hidden instructions half way through the adventure. The game looks above the usual Texas standard without being the usual high Texas price.

Program *Adventuremania*
Price £5.95
Micro Texas Instruments
99/4A
Supplier Intrigue Software
Cranbrook Road
Tenterden
Kent TN30 6UJ

VISUAL MENU



There's no doubt about it. The Commodore 64 has great sound — if there's a single reason to switch from a Spectrum, that's it.

The problem is the effects are not very easy to get at — around five Pokes per noise. If only someone could make it simpler.

They have (aren't market forces wonderful) and *Ultisynth 64* is the result. The program enables you to use your Commodore 64 as a synthesiser, record your creations and play them back.

What the program does, essentially, is enable you to control the various parameters of each sound using a visual menu — for the note values you can use the keyboard, playing it like a piano.

What the program proves once again is that the Commodore 64 is a wonderful machine (some of the sounds are really impressive) but one

that Commodore have documented very badly indeed — hence the place for programs like this. The manual that comes with the program is excellent.

Program *Ultisynth 64*
Price £14.95
Micro Commodore 64
Supplier Quicksilva
Palmerston Park House
13 Palmerston Road
Southampton
Hampshire
SO1 1LL

LOST TOMB



Aztec Tomb is a graphic adventure for the Commodore 64 from Alligata Software. It's vast, taking 15 minutes to load, so it should see you all through Christmas.

Your task is to locate a lost Aztec tomb, hidden deep within the Amazon rain forest. Each location in the jungle is illustrated by a picture like the Hobbit.

The cover blurb warns you that this is no ordinary jungle, strange things can and will happen. The scope of the program and quality of the graphics should ensure that this one does well.

Program *Aztec Tomb*
Price £7.95
Micro Commodore 64
Supplier Alligata Software
178 West Street
Sheffield S1 4ET

New Releases is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

This Week

Program	Type	Micro	Price	Supplier
Advertiser	Ut	Spectrum	£17.95	Brane
Alien Swoop	Arc	Spectrum	£4.50	Space Age
Aliens	Arc	Aquarius	£5.95	Add On
Battlezone	S	BBC	£6.95	Lothlorien
Beyond Basic	Ut	Spectrum	£9.95	Sinclair
Bubble Trouble	Arc	Spectrum	£5.50	Arcade
Bugged	Arc	Dragon	£6.95	Dungeon
Business Pack No. 1	Arc	BBC	£159.95	Gemini
Business Pack No. 2	Ut	BBC	£79.95	Gemini
Business Pack No. 3	Ut	Electron	£79.95	Gemini
Chuckman	Arc	Aquarius	£5.95	Add On
Cosmic Split	Arc	Commodore 64	£7.95	PSS
Creator's Eye	Arc	Commodore 64	£7.95	Mogul
Data Genie	Ut	Spectrum	£9.95	Audiogenic
Diabetes	Ut	Spectrum	£9.95	Martin Dunitz
Dietician	Ut	Spectrum	£6.95	Keysoft
Ed On	Arc	Aquarius	£5.95	Add On
Evolution	S	Spectrum	£6.95	Microsphere
Family Pack	Arc	Spectrum	£8.50	Keysoft
Family Tree	S	Spectrum	£6.50	Keysoft
Fig Forth	Ut	Commodore 64	£19.99	Romik
Fire Hawks	Arc	Spectrum	£6.95	Postern
Five Treasures	Ad	Spectrum	£6.95	Space Age
Floyd's Bank	Arc	Lynx	£9.99	Romik
Freez'Bees	Arc	Spectrum	£5.95	Silversoft
Galaxy	Arc	Commodore 64	£7.95	Anirog
Games Pack 1	Arc	Lynx	£7.95	Gem
Happy Letters	Ed	BBC	£8.97	Bourne
Home Pack No. 1	Ut	BBC/Electron	£79.95	Gemini
Home Pack No. 2	Ut	Spectrum	£59.95	Gemini
House of the Living Dead	Arc	Spectrum	£5.90	Phipps
Keyfile	Ut	Spectrum	£7.95	Keysoft
Kick Off	Arc	Commodore 64	£6.99	Bubble Bus
Killer Knight	Arc	Spectrum	£5.90	Phipps
Krystals of Zong	Arc	Commodore 64	£7.95	PSS
Laser Shaker	Arc	Spectrum	£5.95	Poppy
Light Cycles	Arc	BBC B	£7.50	Paean
Loony Zoo	Arc	Spectrum	£5.90	Phipps
Magic Meanies	Arc	Spectrum	£5.95	CDS
Metamorphosis	Arc	Commodore 64	£7.95	Mogul
Micro Drive In	Arc	Spectrum	£6.95	Softel
Military Quiz	S	BBC	£5.00	Logic Soft
Moby Dick	Arc	Commodore 64	£7.95	PSS
Mr Wimpy	Arc	Spectrum	£5.90	Ocean
Music Master	Ut	Spectrum	£9.95	Sinclair
Music Monitor	Ut	Spectrum	£4.50	Space Age
N Vaders	Arc	Aquarius	£5.95	Add On
Neoclyps	Arc	Commodore 64	£7.95	PSS
Oh Mummy	Arc	Lynx/Spectrum	£7.95	Gem
Orion	Ut	Oric 1	£12.95	Lothlorien
Robot Riot	Arc	Spectrum	£5.95	Silversoft
Roman Empire	S	Lynx	£7.95	Lothlorien
Sam Spade	Arc	Spectrum	£5.95	Silversoft
Scan	S	BBC B	£7.50	Paean
Scroller	Ut	Spectrum	£7.95	Brane
Spanner Man	Arc	Lynx	£7.95	Gem
Sub Chase	Arc	Spectrum	£4.95	Gem
Tank Attack	Arc	BBC B	£7.95	Gem
Three Dee Space Wars	Arc	Spectrum	£5.95	Spectrum
Timeman Two	Ed	BBC	£8.97	Bourne
Turbo Grid	Arc	Vic20	£5.50	Microdeal
Urban Upstart	Ad	Spectrum	£6.50	Richard Shepherd

Book Ends



PROPER BASIC

An excellent book for those who believe in doing things properly even if that means paying more is *Proper Basic* by Brian C Walsh.

Although clearly written and full of diagrams, the book looks as though it is primarily intended for schools and colleges. It contains more or less everything you could ever need to know about Basic in all its forms.

The book would be a good reference work for questions about the theoretical nature of Basic, but make sure it's really what you need — it costs £12.50.

Book *Proper Basic*

Price £12.50

Micro General

Supplier John Wiley
Baffins Lane
Chichester
West Sussex
England PO19 1UD

Not, I should stress, that there is anything very gory or nail-biting about any of the stories. They're all about solving science projects and finding out how many marbles are in a jar.

Book *Bytes Brothers Input an Investigation*

Price £1.25

Micro General

Supplier Fontana Paperbacks
8 Grafton Street
London W1X 3LA

EDUCATION

More than anything else the BBC computer is associated with education — both of children and adults.

BBC Micro in Education is a book aimed squarely at this market and is intended to be used by teachers within classwork as well as in homes.

The book is a mixture of general information about the history and development of computers as well as specific instruction on BBC Basic.

Book *BBC Micro in Education*

Price £6.50

Micro BBC

Supplier Shiva Publishing
4 Church Lane
Nantwich
Cheshire CW5 5RQ

MYSTERY

A nice idea for the younger computer owner. *The Bytes Brothers Input an Investigation* is a book in which fiction is interlaced with computer programs. The Bytes Brothers use the programs to help solve their mysteries.

Util 1	Ut	BBC B	£9.95	Gem
Wheelie	Arc	Spectrum	£5.95	Microsphere

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to: This Week, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

Key: Ad — adventure/Arc — arcade/Ed — education/
S — strategy-simulation/Ut — utility

Top 10

BBC*	
1 (5) Planetoids	(Acornsoft)
2 (2) Hopper	(Acornsoft)
3 (1) Rocket Raid	(Acornsoft)
4 (1) Chess	(Acornsoft)
5 (4) Alien Swirl	(Program Power)
6 (7) White Knight Mix 2	(BBC)
7 (3) Swoop	(Program Power)
8 (6) Castle of Riddles	(Acornsoft)
9 (6) Monsters	(Acornsoft)
10 (1) Dr Who — The First Adventure	(BBC)

*All Model B.
(Figures compiled by Micro Management, Ipswich 0473 59181)

Top 10

Atari	
1 (1) Miner 2049er	(Big Five)*
2 (1) Shadow World	(Synapse)††
3 (5) Zaxxon	(Datasoft)
4 (1) Ultima II	(Sierra On-Line)†
5 (1) Marswader	(Sierra On-Line)†
6 (1) Savage Island Part 1	(Adventure International)†
7 (1) GFS Sorceress	(Avalon-Hill)†
8 (1) Lords of Karma	(Avalon-Hill)†
9 (1) Escape for Pulsar 7	(Channel 8)
10 (1) Preppie	(Adventure International)

*Cartridge, †32K cassette, †48K cassette, †32K disc, †48K disc.
(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

Top 10

Vic20	
1 (3) Wacky Waiters	(Imagine)
2 (1) Arcadia	(Imagine)
3 (1) Jetpac	(Ultimate)
4 (1) Catcha Snatcha	(Imagine)
5 (1) Flight-Zero-One-Five	(AUS)
6 (1) Tombs of Domb	(Audiogenic)
7 (7) Skyhawk	(Quicksilva)
8 (6) Gridrunner	(Limagsoft)
9 (2) Wizard and the Princess	(NEC)
10 (1) Paratroopers	(Rabbit)

(Figures compiled by Boots & Co/Websters)

Top 10

ZX81*	
1 (1) Flight Simulation	(Psion)
2 (1) Football Manager	(Addictive Games)
3 (1) 1K Games	(Artic†)
4 (1) Defender	(Quicksilva)
5 (2) OS Scramble	(Quicksilva)
6 (1) Planet of Death	(Artic)
7 (1) Invaders	(Quicksilva)
8 (1) Mothership	(Softsync)
9 (4) 1K Chess	(Artic)
10 (3) Asteroids	(Quicksilva)

*All run in 16K, †1K only.
(Figures compiled by Boots & Co/Websters)

Spectrum

1 (4) Chequered Flag	(Psion)*
2 (7) Alic Atac	(Ultimate)*
3 (1) The Pyramid	(Fantasy)*
4 (3) 3d Ant Attack	(Quicksilva)*
5 (2) Kong	(Ocean)*
6 (1) Lunar Jetman	(Ultimate)*
7 (5) Manic Miner	(Bug-Byte)
8 (10) Splat!	(Incentive)*
9 (8) Flight Simulation	(Psion)*
10 (1) Scramble	(Psion)

*Requires 48K.
(Figures compiled by W H Smith and Son, London)

Books

1 (5) BBC Micro Disk Companion	Latham
2 (4) Spectrum Microdrive Book	Logan
3 (9) Spectrum Interfacing and Projects	Bishop
4 (8) Advanced Graphics for the ZX Spectrum	Angell and Jones
5 (2) 30 Hour Basic	Prigmore
6 (8) Using the 64	Gerrard
7 (1) CPM — The Software Bus	Clarke
8 (1) Advanced Programming Techniques for the BBC Micro	McGregor and Watt
9 (10) Commodore 64 Programmer's Reference Guide	Commodore
10 (1) Master Your ZX Microdrive	Pennell

(Figures compiled by Watford Technical Books, Watford 0923 23324 Prestel 28824 (Last week's position in brackets))

Dragon 32

1 (2) Pettigrew's Diary	(Shards)
2 (1) Mined Out	(Quicksilva)
3 (5) Dragonfly 2	(Hewson)
4 (1) Transylvanian Tower	(Richard Shepherd)
5 (1) Cuthbert Goes Walkabout	(Microdeal)
6 (1) SAS	(Peaksot)
7 (4) Ring of Darkness	(Wintersoft)
8 (1) Tiger Grand Prix	(Tiger)
9 (1) Dragon Trek	(Salamander)
10 (7) Champions	(Peaksot)

(Figures compiled by Boots & Co/Websters)

Ziggurat



Structured Pascal

Last week I examined some of the features of Fort, picking out those I think should appear in our ideal language. This week, I'll look at Pascal in the same way.

The most notable feature of Pascal is that it is structured. Effectively, this means that it discourages you from using *Goto* statements by providing *Repeat*, *While* and *Case* statements. Some beginners feel that structured programming is not beneficial, but I must stick my neck out and say that faster, better programs will be written if you use structured techniques.

Amateur programmers or beginners find *Goto* easier to use, but our ideal language is not aimed at either group. Beginners are well served by Basic, Pascal and Logo, whilst amateur programmers who persist in ignoring structured programming are doing themselves a disservice.

Thus, our ideal language will use the three basic structures of Pascal. Other elements of the structured nature of Pascal are the procedures and functions. I covered these in my last column, drawing the conclusion that not only should one be able to define procedures and functions, but also operators.

In addition, Pascal offers user defined data types. These are a great idea on the whole, but they lead to the odd Pascal situation where types cannot be mixed — eg, 'A : = 2+2.0' causes a crash on most systems. I suggest user defined types should be implemented, with automatic type conversion where feasible.

One of the most important features of Pascal, and its siblings such as Algol and BCPL, is the block structure. This allows you to treat a group of statements as a single statement, if they are bracketed by special words or symbols. This is

admirable, since it makes the language easy to compile and interpret, but is difficult for beginners to learn. However, one has to draw the distinction between easy to learn and easy to use. Block structuring is a tricky concept for some people, but once grasped, it is elegant and simple to use.

The feature of Pascal that seems to annoy people most is the use of the ':=' symbol to indicate an assignment statement. I am inclined to make the colon optional, on the understanding that many people do not find it necessary, especially those reared on Basic.

A major disadvantage of Pascal is that it is rarely interpreted. As I said before, our language must be both interpreted and compiled, to allow easy program development and both speed and security from the compiler.

This leads to several problems. For example, BBC Basic provides the *Eval* function to evaluate an expression. This is very useful in graph plotting applications, but it is impossible to compile. For example, consider the fragment:

```
D=23
D:=AS"D*2"
PRINT EVAL(AS)
```

When this is compiled, the computer will no longer know the variables *D* and *AS* by name, only by their address. Thus, it will not be able to compile the previous routine.

The name of each variable could be stored in the compiled program, but it would add considerably to the space it takes up. A more pertinent objection is that the compiled code will need access to a complete expression evaluator, which forms a substantial part of the interpreter itself. Thus, the compiled code would swell to enormous proportions if *Eval* was used.

So, I maintain that certain functions are impossible to compile. This leads to an interesting question — should we provide these functions in the interpreter, but not in the compiler? If we do, there will be incompatibilities between the two, which is ugly. So, do you attach more value to compatibility or to features? Personally, I am tempted not to provide such functions at all, but there is room for debate on the subject.

Finally, some people have asked whether this series is building up to naming a specific language as the mythical ideal. I shall not divulge the answer yet — but it would be nice to find our ideal language existed.

Jeremy Ruston

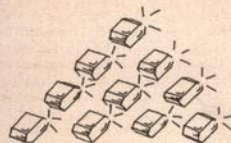
Puzzle

Forty thieves

Puzzle No 86

Once upon a time, many years ago, not far from old Baghdad, lived Ali Baba and his 40 thieves.

In their secret cave they examined the spoils of their latest robbery — a fortune in emeralds. The precious stones were laid out on the cave floor in the form of a triangular pattern similar to the one shown here:



As there were more jewels than is shown, the triangle was much larger than this, but its general arrangement was as illustrated, with every row being complete.

The next day, when Ali Baba awoke, he found to his horror that the 40 thieves had departed taking with them all but one of the jewels. They had divided up the jewels equally amongst them and, as they had one left over, they left it for poor Ali Baba.

What was the smallest number of gems that could have been present?

Solution to Puzzle No 81

The program generates integer squares, *Z*, and tests to see if each is made up of two integer squares, *A*×*A* and *B*×*B*.

```
10 LET X = 7 20 LET P = 1 30 LET Q = 1 40 LET Z =
X*X 50 FOR A = 1 TO X-1 60 IF A*A>=P*10
THEN LET P = P*10 70 FOR B = 1 TO X-1 80 IF
B*B>=Q*10 THEN LET Q = Q*10 90 IF (Z -
B*B)/Q = A*A*10 OR (Z - A*A)/P = B*B*10
THEN PRINT "A*A=";A*A;"B*B=";B*B;"Z=";
Z 100 NEXT B 110 NEXT A 120 LET X = X + 1 130
GOTO 20
```

This gives an answer of 3249 (57²) made up of 324 (18²) and 9 (3²).

Winner of Puzzle No 81

The winner is: G Murray, Honeyborough, Neyland, Dyfed, who receives £10.



DEAR AUTOMATA, PLEASE RUSH ME THE FOLLOWING.....

"THE PIMAN'S CHRISTMAS STOCKING", including
 "THE PIMAN'S GREATEST HITS" STEREO L.P. CASSETTE,
 THE PIMAN 1984 CARTOON CALENDAR BOOK plus
 THE PIMAN'S OWN BLANK C20 COMPUTER CASSETTE. £5 0
 "MY NAME IS ONICLA GROUCHO, YOU WIN A FAT CIGAR"
 (48K SPECTRUM) "Not so much a game, more a way
 of life. Excellent, excellent." (Your Computer)
 with CONCORD-QE3-HOLLYWOOD PRIZE & FREE SINGLE! £10
 "YAKZEE" (DRAGON 32 and 48K SPECTRUM) "Brudie
 wonderfurr game of ruck and skirr!" (Confessions) £5
 "MORRIS MEETS THE BUKENS" (ANY SPECTRUM) Arcade
 challenge, with an outrageous FREE HIT SINGLE! £6 0
 I ENCLOSE THE RIGHT MONEY, TOTAL £.....
 OR PLEASE DEBIT MY ACCESS / EURO / VISA / MASTER CARD

CARD NUMBER.....

MY SIGNATURE.....

MY NAME.....

MY ADDRESS.....

POST CODE.....

30 EXTRA! ALL OUR PRICES ARE INCLUSIVE OF VAT AND DELIVERY

SEND TO: **Automata UK Ltd.**
 27 HIGHLAND ROAD, PORTSMOUTH, HANTS., PO4 9DA, ENGLAND.....

* **CHRISTMAS HOTLINE**
 24-hour mail-order service
 Telephone (0705) 735242

THE STORY SO FAR: SANTA HAS BEEN CONNED BY THE WILEY ROTTERS, PENFOLD AND GROUCHO, OUT OF HIS TOY FACTORY, HIS HELPERS AND HIS ANNUAL CONTRACT TO SPREAD HAPPINESS AND JOY... SO, A S THE NORTH POLE PLANT IS GIVEN OVER TO CHURNING OUT AUTOMATA GAMES, THE PIMAN, GROUCHO AND LADY CLAIR SINCLIVE SHOOT DOWN TO THE "YOUR COMPUTER" CHRISTMAS FAIR, AT THE WEMBLEY CONFERENCE CENTRE (15th-18th DECEMBER) TO MEET THEIR BOSSES AND FLASH THEIR WARES....



EVANS



